

AIR REGISTRATION BOARD



**BRITISH CIVIL
AIRWORTHINESS REQUIREMENTS**

**SECTION
A
GENERAL INFORMATION
AND PROCEDURE**

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A.R.B. HEAD OFFICE

CHANGE OF ADDRESS

All concerned are asked to note that the Board has moved its Headquarters out of London and the new address is as follows:—

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AIR REGISTRATION BOARD

British Civil Airworthiness Requirements

SECTION

A

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FOREWORD

1 PURPOSE British Civil Airworthiness Requirements (hereinafter referred to as the "Requirements") of which Section A is a constituent part, are published by the Air Registration Board ; they comprise minimum requirements and constitute the basis on which recommendations to the Minister of Aviation will be made.

2 INTERPRETATION

2.1 The Requirements, with or without explanatory matter, should not be regarded as constituting a text book of current aeronautical knowledge ; interpretation of the Requirements against a background of such knowledge is essential.

2.2 Where necessary the Requirements are supplemented by Appendices printed in blue for easy recognition. These Appendices take the form of acceptable interpretations of requirements.

2.3 Mandatory clauses are invariably denoted by the use of "shall" or "must" ; "should" or "may" are used in the text to introduce permissive or recommended clauses.

2.4 It is implicit in requirements expressed qualitatively (e.g. "readily visible", "adequately tested", etc.) that the Board will adjudicate in cases where doubt exists.

3 EDITORIAL PRESENTATION

3.1 Section A is divided into seven sub-sections numbered consecutively. The sub-sections are further divided by subjects into chapters, the numbering of each chapter being associated with its sub-section (e.g. Sub-section A2 contains Chapters A2—1, A2—2, etc., up to A2—6).

3.2 Details of the subjects contained in the Chapters are given in the CONTENTS.

3.3 A system of progressive paragraph numbering is used but the number of digits is kept to a maximum of three by associating the system with paragraph headings. A paragraph heading applies to all succeeding paragraphs until another titled paragraph with the same, or a smaller, number of digits occurs.

4 ISSUE AND AMENDMENT

4.1 When new issues of the Section are made or if, in exceptional circumstances, it is necessary to supplement or supersede any part of the published Section, suitable announcements will be made in the Aeronautical Press.

4.2 Material differences from the previous issue are indicated by marginal lines.

5 EFFECTIVE DATE New requirements and amendments introduced into this Section become effective on the date printed on the issue in which they first appear, unless a statement to the contrary is made in the text.

6 APPLICATIONS AND ENQUIRIES Applications for further copies of this Section should be addressed to the Technical Publications Department, Air Registration Board, Greville House, 37 Gratton Road, Cheltenham, Glos. Applications for permission to reproduce any part of the Requirements and all enquiries regarding their technical content should be addressed to the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2.

CHAPTER A1—I

CLASSIFICATION OF AIRCRAFT IN THE CERTIFICATE OF AIRWORTHINESS

I GENERAL

- 1.1 The certificate of airworthiness or associated documents imposes conditions affecting the manner in which an aircraft may be flown and the purposes for which it may be used.
- 1.2 The conditions are imposed in the following manner :—
 - 1.2.1 By classifying the aircraft in categories which indicate the uses for which the aircraft is approved.
 - 1.2.2 By indicating (either in the certificate of airworthiness or in documents associated with the certificate) the detailed limitations which must be observed.

2 CLASSIFICATIONS

- 2.1 An aircraft is classified as belonging to one or more of the following categories :—
 - Transport Category (Passenger).
 - Transport Category (Cargo).
 - Aerial Work Category.
 - Private Category.
 - Special Category.
- 2.2 The purposes for which the aircraft may fly are as follows :—
 - Transport Category (Passenger) : Any purpose.
 - Transport Category (Cargo) : Any purpose other than the public transport of passengers.
 - Aerial Work Category : Aerial work only.
 - Private Category : Any purpose other than public transport or aerial work.
 - Special Category : Any special purpose specified in the certificate of airworthiness but not including the carriage of passengers unless particularly permitted.

NOTE : The period of validity of the certificate in the Special Category may, according to the circumstances of the case, be less than the usual twelve months.

- 2.3 An application may at any time be submitted to the Board for classification of an aircraft under categories other than those shown on its certificate of airworthiness.

CHAPTER A2—I

ISSUE OF CERTIFICATE OF AIRWORTHINESS FOR PROTOTYPE AIRCRAFT

NOTE : (i) A "prototype aircraft" means an aircraft in respect of which an application has been made for a certificate of airworthiness and the design of which has not previously been investigated in connection with any such application.

(ii) A recommendation for the issue of a certificate of airworthiness to a prototype aircraft will be based on compliance with the procedures outlined in this chapter.

I APPLICATION

- 1.1 C.A. Forms 3 and 3A, copies of which may be obtained from the Secretary, Ministry of Aviation, Shell Mex House, London, W.C.2, shall be completed at an early stage of the design of the aircraft.
- 1.2 C.A. Form 3 shall be returned to the Secretary, Ministry of Aviation, Shell Mex House, London, W.C.2, and C.A. Form 3A shall be forwarded to the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2. A deposit fee

shall be lodged with the Board. (The Board cannot undertake the investigation until an application and deposit fee are lodged.) The amount of the deposit fee and the method of payment of the balance of the total fee will be notified to the applicant in writing on receipt of the application.

NOTE : The total fee payable by the applicant will be on a cost basis subject to the over-riding maximum prescribed in Form 3A.

- 1.3 If for any reason the aircraft design is changed during the course of the investigation and, as a result, a substantial part needs re-investigation, the Board may require the application to be closed and a new application and a further deposit fee lodged.

2 DESIGN

- 2.1 The applicant shall, through the medium of a Design Organisation approved by the Board for the purpose (see Chapter A7—1), ensure that the design of the aircraft satisfies :
- (i) The Requirements in force at the time the application for a certificate of airworthiness is received by the Board.
 - (ii) Such other requirements as the Board may notify in respect to the aircraft design.
- 2.2 All relevant design information, data, calculations, drawings and reports on tests shall be held at the disposal of the Board. No such records shall be destroyed without prior authorisation by the Board.
- 2.3 Each design drawing shall bear a descriptive title, drawing number, issue number and date of issue. All alterations to design drawings shall be made in accordance with a drawing amendment system which ensures that design records are suitably amended.
- 2.4 If an alteration is made to a drawing, a new issue number and date shall immediately be allocated to the drawing, irrespective of whether the alteration is permanent or experimental. Where an alteration affects the interchangeability of an item in any respect whatsoever, the original part number of the item shall be completely changed to provide positive identification of the modified item.
- 2.5 The applicant's Approved Design Organisation shall forward to the Board a Certificate of Design signed by the Chief Designer and worded in the following form :—

CERTIFICATE OF DESIGN

Aircraft Type.....

Registration Marks.....

Constructor's Serial Number of the Aircraft.....

Classification in Certificate of Airworthiness

Categories.....

Performance Group (see Section D of B.C.A.R.).....

Engine(s) type.....

I certify that, with the exceptions stated below, the above aircraft is of a design which complies with British Civil Airworthiness Requirements published by the Air Registration Board current on (date).....and the additional requirements which have been notified by the Board in writing as applying to this aircraft, and which are listed below.

Exceptions : Additional requirements

.....

.....

.....

.....

(Signed)

(Firm)

A.R.B. Approval Ref. No.....

Date

2.6 The applicant's Approved Design Organisation shall submit to the Board a Type Record containing a summary of the aircraft design. The information given in the Type Record shall be consistent with the evidence on which compliance with the Board's requirements is claimed and shall include the following information and such additional information as the Board may require in any particular case.

- (i) A three-view general arrangement drawing of the aircraft.
- (ii) A list of the general arrangement drawings which, in themselves and by their reference to other drawings, completely define the design of the aircraft.
- (iii) A summary of the basic aerodynamic and other data used in the aircraft design.
- (iv) A summary of the design assumptions and calculations.
- (v) A summary of the aircraft weight and centre of gravity details (see Chapter A5—1).
- (vi) A list of reserve factors for ultimate load conditions at all critical parts of the aircraft structure.
- (vii) Copies of reports giving the particulars and results of airworthiness acceptance tests.
- (viii) Particulars of such deviations from the Board's requirements as may have been authorised with respect to the aircraft design (giving the reference number of the Board's written authority for the deviations).
- (ix) Copies of such subsidiary type records and Declarations of Design and Performance, as may have been prepared with respect to the components or equipment of the aircraft (see Chapters A3—3 and A3—4).

3 CONSTRUCTION

3.1 The aircraft shall be constructed under the supervision of an Inspection Organisation approved by the Board for the purpose (see Chapter A7—5). Before the construction of any part of the aircraft is finally certified, the Chief Inspector of the Approved Inspection Organisation shall satisfy himself that the particular part has been constructed, inspected and, where necessary, tested in conformity with the specifications, drawings, and instructions relating to the approved design.

3.2 During the course of construction and of airworthiness acceptance testing the aircraft shall be made available so that the Board may carry out such check inspections as it considers necessary.

3.3 All relevant inspection records shall be made available to the Board for examination and shall be retained for a period of 5 years (unless earlier disposal is authorised by the Board) but in any case no inspection records shall be destroyed without prior authorisation by the Board.

4 GENERAL

4.1 The aircraft shall be weighed and copies of the Weight and Centre of Gravity Schedule and, if required, the Weight and Balance Report shall be provided (see Chapter A5—1).

4.2 A certificate of fitness for flight shall be issued and the aircraft shall be tested in flight to schedules approved by the Board (see Chapter A5—2). Particulars and results of such testing shall be provided.

CHAPTER A2—1

ISSUE OF CERTIFICATE OF AIRWORTHINESS FOR PROTOTYPE AIRCRAFT

- 4.3 Particulars for inclusion in the Flight Manual shall be provided (see Chapter A6—1).
- 4.4 Copies of the Maintenance, Overhaul and Repair Manuals (Chapters A3—4 and A6—2), and the Crew Manual (Chapter A6—7), shall be provided.
- 4.5 The Applicant's Approved Inspection Organisation shall ensure that an Inspection Record (A.R.B. Form 268, copies of which may be obtained from the Board) is completed and returned to the Board.

CHAPTER A2—2

ISSUE OF CERTIFICATE OF AIRWORTHINESS FOR PROTOTYPE (MODIFIED) AIRCRAFT

- NOTE : (i) A "prototype (modified) aircraft" means an aircraft for which an application for a certificate of airworthiness has been made but which does not conform in all essential respects to the prototype and, in consequence, the design of which, in part, has not previously been investigated.
- (ii) A recommendation for the issue of a certificate of airworthiness to a prototype (modified) aircraft will be based on compliance with the procedures outlined in this chapter.

1 APPLICATION

- 1.1 C.A. Forms 3 and 3A, copies of which may be obtained from the Secretary, Ministry of Aviation, Shell Mex House, London, W.C.2, shall be completed at an early stage of the design of the modification.
- 1.2 C.A. Form 3 shall be returned to the Secretary, Ministry of Aviation, Shell Mex House, London, W.C.2, and C.A. Form 3A shall be forwarded to the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2. A deposit fee equivalent to the fee for a series aircraft, particulars of which are given in C.A. Form 3A, shall accompany the application forwarded to the Board. (The Board cannot undertake the investigation until an application and deposit fee are lodged.) During the course, or upon completion, of the investigation, any further fee which may be payable to the Board will be notified to the applicant in writing.
- 1.3 If for any reason the design of the modification is changed during the course of the investigation and, as a result, a substantial part needs re-investigation, the Board may require the application to be closed and a new application and further deposit fee lodged.

2 DESIGN

- 2.1 The applicant shall, through the medium of a Design Organisation approved by the Board for the purpose (see Chapter A7—1), ensure that :
 - (i) With the exception of the proposed modifications, the design of the aircraft is similar in every respect to that of an aircraft which has already held a certificate of airworthiness.
 - (ii) The proposed modifications are such that the design of the aircraft, when modified, satisfies such requirements as the Board may notify to the applicant in writing.
- 2.2 All relevant design information, data, calculations, drawings and reports on tests shall be held at the disposal of the Board. No such records shall be destroyed without prior authorisation of the Board.

- 2.3 Each design drawing shall bear a descriptive title, drawing number, issue number and date of issue. All alterations to design drawings shall be made in accordance with a drawing amendment system which ensures that design records are suitably amended.
- 2.4 If an alteration is made to the drawing, a new issue number and date shall immediately be allocated to the drawing, irrespective of whether the alteration is permanent or experimental. Where an alteration affects the interchangeability of an item in any respect whatsoever, the original part number shall be completely changed to provide positive identification of the modified item.
- 2.5 The applicant's Approved Design Organisation shall forward to the Board a Certificate of Design signed by the Chief Designer and worded in the following form :—

CERTIFICATE OF DESIGN

Aircraft Type.....
Nationality and Registration Marks.....
Constructor's Serial Number of Aircraft.....
Classification in Certificate of Airworthiness
Categories

Performance Group (see Section "D" of B.C.A.R.).....
Engine(s) type.....

I hereby certify that, with the exception of the modifications enumerated below the design of the above aircraft is similar in every respect to that of aircraft,

Constructor's Serial Number

Modifications :

.....
.....
.....

I further certify that, with the exceptions stated below, the aircraft (Constructor's Serial Number).....is of a design which complies with British Civil Airworthiness Requirements published by the Air Registration Board, current on (date).....and with such other requirements as have been notified by the Board in writing as applying to this aircraft.

Exceptions :

.....
.....
.....

(Signed)

(Firm)

A.R.B. Approval Ref. No.....

Date

- 2.6 The Applicant's Approved Design Organisation shall prepare an Addendum to the Type Record. The Addendum shall contain particulars of design changes made and all consequent changes to the information given under each heading of the relevant Type Record. A copy of the Addendum, when completed, shall be forwarded to the Board.

3 CONSTRUCTION

- 3.1 The aircraft shall be constructed under the supervision of an Inspection Organisation approved by the Board for the purpose (see Chapter A7—5). Before the construction of any part of the aircraft is finally certified, the Chief Inspector of the Approved

Inspection Organisation shall satisfy himself that the particular part has been constructed, inspected and, where necessary, tested in conformity with the specifications, drawings, and instructions relating to the approved design.

- 3.2 During the course of construction and of airworthiness acceptance testing, the aircraft shall be made available so that the Board may carry out such check inspections as it considers necessary.
- 3.3 All relevant inspection records shall be made available to the Board for examination and shall be retained for a period of 5 years (unless earlier disposal is authorised by the Board) but in any case no inspection records shall be destroyed without prior authorisation by the Board.

4 GENERAL

- 4.1 The aircraft shall be weighed and copies of the Weight and Centre of Gravity Schedule and, if required, the Weight and Balance Report shall be provided (see Chapter A5—1).
- 4.2 A certificate of fitness for flight shall be issued and the aircraft shall be tested in flight to schedules approved by the Board (see Chapter A5—2). Particulars and results of such testing shall be provided.
- 4.3 Particulars for inclusion in the Flight Manual shall be provided (see Chapter A6—1).
- 4.4 Copies of the Maintenance, Overhaul and Repair Manuals (Chapters A3—4 and A6—2), and the Crew Manual (Chapter A6—7), shall be provided.
- 4.5 The applicant's Approved Inspection Organisation shall ensure that an Inspection Record (A.R.B. Form 268, copies of which may be obtained from the Board) is completed and returned to the Board.

CHAPTER A2—3

ISSUE OF CERTIFICATE OF AIRWORTHINESS FOR SERIES AIRCRAFT

NOTE : (i) A "series aircraft" means an aircraft in respect of which an application has been made for a certificate of airworthiness and the design of which is similar in every essential respect to the design of an aircraft for which a certificate of airworthiness has previously been issued.

(ii) A recommendation for the issue of a certificate of airworthiness to a series aircraft will be based on compliance with the procedures outlined in this chapter.

I APPLICATION

- 1.1 C.A. Forms 3 and 3A, copies of which may be obtained from the Secretary, Ministry of Aviation, Shell Mex House, London, W.C.2, shall be completed at an early stage of the construction of the aircraft.
- 1.2 C.A. Form 3 shall be returned to the Secretary, Ministry of Aviation, Shell Mex House, London, W.C.2, and C.A. Form 3A shall be forwarded to the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2. The appropriate fee, particulars of which are given in C.A. Form 3A, shall accompany the application sent to the Board. (The Board cannot undertake the investigation until an application and fee are lodged.)

2 CONSTRUCTION

- 2.1 The aircraft shall be constructed under the supervision of an Inspection Organisation approved by the Board for the purpose (see Chapter A7—5). Before the construction of any part of the aircraft is finally certified, the Chief Inspector of the Approved Inspection Organisation shall satisfy himself that the particular part has been constructed, inspected and, where necessary, tested in conformity with the specifications, drawings, and instructions relating to the approved design.
- 2.2 During the course of construction and of airworthiness acceptance testing the aircraft shall be made available so that the Board may carry out such check inspections as it considers necessary.
- 2.3 Each design drawing shall bear a descriptive title, drawing number, issue number and date of issue. All alterations to design drawings shall be made in accordance with a drawing amendment system which ensures that design records are suitably amended.
- 2.4 If an alteration is made to a drawing, a new issue number and date shall immediately be allocated to the drawing, irrespective of whether the alteration is permanent or experimental. Where an alteration affects the interchangeability of an item in any respect whatsoever, the original part number of the item shall be completely changed to provide positive identification of the modified item.

3 GENERAL

- 3.1 The aircraft shall be weighed and copies of the Weight and Centre of Gravity Schedule and, if required, the Weight and Balance Report shall be provided (see Chapter A5—1).
- 3.2 A certificate of fitness for flight shall be issued and the aircraft shall be tested in flight to schedules approved by the Board (see Chapter A5—2). Particulars and results of such testing shall be provided.
- 3.3 Particulars for inclusion in the Flight Manual shall be provided (see Chapter A6—1).
- 3.4 Copies of the Maintenance, Overhaul and Repair Manuals (Chapters A3—4 and A6—2), and the Crew Manual (Chapter A6—7), shall be provided.
- 3.5 The applicant's Approved Inspection Organisation shall ensure that an Inspection Record (A.R.B. Form 268, copies of which may be obtained from the Board) is completed and returned to the Board.

CHAPTER A2—4

VALIDATION OF CERTIFICATES OF AIRWORTHINESS

- NOTE : (i) Validation of certificates of airworthiness is confined to those certificates issued for aircraft registered in the United Kingdom, the aircraft having been designed and constructed in a country other than the United Kingdom.
- (ii) A recommendation for the validation of a certificate of airworthiness will be based on compliance with the procedures outlined in this chapter except in so far as they may be amended by valid agreements for reciprocal validation.
- (iii) A recommendation for the validation of a certificate of airworthiness does not include any radio apparatus that may be installed in the aircraft. Such radio apparatus must comply with the requirements of Chapter A3—4, paragraph 3.

1 APPLICATION

- 1.1 C.A. Forms 221 and 221A, copies of which may be obtained from the Secretary, Ministry of Aviation, Shell Mex House, London, W.C.2, shall be completed.

1.2 C.A. Form 221 shall be returned to the Secretary, Ministry of Aviation, Shell Mex House, London, W.C.2, and C.A. Form 221A shall be forwarded to the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2. A deposit fee, equivalent to the fee for a series aircraft, shall accompany the application forwarded to the Board. (The Board cannot undertake the investigation until an application and deposit fee are lodged.) During the course, or upon completion, of the investigation, any further fee which may be payable to the Board will be notified to the applicant in writing.

2 GENERAL

2.1 The applicant shall for every aircraft send to the Board the Certificate of Airworthiness and shall provide for inspection the associated Flight Manual (when such a manual has been issued) and in addition may be required to furnish the following particulars :—

- (i) The National Requirements with which the aircraft complies (giving title, issue number and effective date).
- (ii) Such deviations from the National Requirements as may have been authorised in writing by the Authority which issued the Certificate of Airworthiness.

In the case of aircraft of a type for which United Kingdom validation has not previously been granted, three copies of the approved Flight Manual shall be provided, and these copies shall be supplied with all relevant revisions (see Chapter A6—1).

NOTE : During the investigation of the aircraft, the Board may decide that additional requirements must be met, and the applicant will be informed of such requirements in writing. The requirements at (i) and (ii) above will not be necessary in respect of a foreign aircraft which is similar in all material respects to one for which United Kingdom validation has already been granted.

2.2 The general condition of the aircraft shall be satisfactory to the Board. The aircraft shall be made available so that the Board may carry out such check inspections as it considers necessary. When made ready for inspection, the aircraft shall be in a clean condition and shall be suitably prepared to allow access to structure, control systems, equipment, and installations.

2.3 All relevant records shall be made available to the Board for examination. All inspection records shall be retained for a period of 5 years (unless earlier disposal is authorised by the Board) but in any case shall not be destroyed without prior authorisation by the Board. Maintenance records forming part of the log book (see paragraph 2.6) shall be kept for the same period as the log book, i.e. until a date two years after the aircraft, engine or variable-pitch propeller has been destroyed or has been permanently withdrawn from use.

2.4 If work on the aircraft is required to be undertaken in the United Kingdom, then such work shall be carried out under the supervision of an Inspection Organisation approved by the Board for the purpose (see Chapter A7—5) or under the supervision of an appropriately licensed aircraft engineer. Before the work is finally certified, the Chief Inspector of the Approved Inspection Organisation or the licensed aircraft engineer shall satisfy himself that the work has been carried out, inspected and, where necessary, tested in conformity with the specifications, drawings and instructions relative thereto.

2.5 Full particulars of the work done shall be entered in the appropriate log book and a Certificate of Compliance shall be signed (see Chapter A4—3).

2.6 When the particulars of the work done are so voluminous as to render it inconvenient to enter them in the space provided in the log book, these particulars shall be entered in a separate maintenance record which shall be numbered for identification purposes, certified in the same manner as that required for the relevant entry in the log book, and retained in safe custody in order that it may be produced for examination.

The reference number of such record, and particulars of the place where it may be examined, shall be inserted in the log book together with a brief description of the work to which the record relates. In the case when aircraft, engine, and propeller log books are not required to be kept, the particulars of the work done and relevant certificate shall be entered in a suitable maintenance record book or folder and held available to the Board for examination.

- 2.7 The aircraft shall be weighed and copies of the Weight and Centre of Gravity Schedule and, if required, the Weight and Balance Report shall be provided (see Chapter A5—1).

NOTE : The Board may agree to the acceptance of weight and centre of gravity details obtained from current documents relating to the aircraft.

- 2.8 When required by the Board, a certificate of fitness for flight shall be issued and the aircraft shall be tested in flight to schedules approved by the Board (see Chapter A5—2). Particulars and results of such testing shall be provided.

- 2.9 Copies of the manuals equivalent to those required by Chapters A3—4, A6—2 and A6—7 shall be provided and, in the case of an aircraft of a type for which United Kingdom validation has not previously been granted, two additional copies of these documents shall be supplied to the Board.

2.9.1 Prior to the issue of a certificate of validation, all relevant manuals shall be amended, where necessary, in respect of modifications embodied by the applicant prior to acceptance of the aircraft by the Board for certification. All copies of the amendments shall bear the registration marks of the aircraft concerned and two copies of the amendments shall be lodged with the Board. In the case of an aircraft of a type for which United Kingdom validation has not been granted previously, the applicant shall lodge with the Board two copies of each finally-accepted manual.

2.9.2 It shall be the responsibility of the applicant to make the necessary arrangements with the constructors of the aircraft and its engines to receive amendments to these manuals together with any Service Bulletins that may be issued from time to time.

2.9.3 It shall be the responsibility of the applicant to obtain such additional technical information as the Board may require in respect of the aircraft and its engines.

- 2.10 To facilitate delivery of aircraft to the United Kingdom the Board may, under appropriate circumstances, recommend the issue of a temporary validation before the aircraft and its documents are available for inspection in this country, provided the number and date of issue of the foreign certificate of airworthiness are made available.

- 2.11 The applicant's Approved Inspection Organisation shall ensure that an Inspection Record (A.R.B. Form 268, copies of which may be obtained from the Board) is completed and returned to the Board.

CHAPTER A2—5

RENEWAL AND RE-VALIDATION OF CERTIFICATES OF AIRWORTHINESS

NOTE : (i) Renewal of certificates of airworthiness is confined to those certificates already issued by the Minister of Aviation. Re-validation of certificates of airworthiness is confined to those certificates already validated by the Minister of Aviation.

(ii) The renewal or re-validation of a certificate of airworthiness will be based on compliance with the procedures outlined in this chapter.

APPLICATION A.R.B. Form 200, copies of which may be obtained from any of the Board's offices, shall be completed and forwarded to the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2. The application shall be

accompanied by the appropriate fee, particulars of which are given on the form. (The Board cannot undertake the investigation until the application and fee are lodged.)

NOTE : If the aircraft is not made available within the United Kingdom, nor within the residential area of one of the Board's Surveyors stationed overseas, the Board may require the applicant to meet the cost of visiting the site of the aircraft.

2 GENERAL

2.1 The general condition of the aircraft shall be satisfactory to the Board. The aircraft shall be made available so that the Board may carry out such check inspections as it considers necessary. When made ready for inspection, the aircraft shall be in a clean condition and shall be suitably prepared to allow access to structure, control systems, equipment, and installations. The Certificate of Airworthiness or Flight Manual (if applicable) or Certificate of Validation and foreign Certificate of Airworthiness should also be available.

2.2 All relevant records shall be made available to the Board for examination. All inspection records shall be retained for a period of 5 years (unless earlier disposal is authorised by the Board) but in any case shall not be destroyed without prior authorisation by the Board. Maintenance records forming part of the log book (see paragraph 2.9) shall be kept for the same period as the log book, i.e. until a date two years after the aircraft, engine or variable-pitch propeller has been destroyed or has been permanently withdrawn from use.

2.3 The applicant's Approved Inspection Organisation or an appropriately licensed aircraft engineer shall inspect the aircraft and shall prepare an Inspection Report detailing all work required to be undertaken to maintain the airworthiness of the aircraft. In preparing this report, due regard shall be paid to :—

- (i) Work already certified in the log books and maintenance records of the aircraft.
- (ii) The periods between overhaul which are prescribed or approved by the Board in respect of the aircraft and its parts.
- (iii) Such other requirements or instructions (relating to the maintenance of airworthiness) which are prescribed or approved by the Board in respect of the aircraft and its parts.

2.4 A copy of the Inspection Report referred to in paragraph 2.3 shall be furnished to the Board's Surveyor for examination and such additional work shall be carried out as may be decided by the Board.

2.5 All work undertaken to maintain the airworthiness of the aircraft shall be carried out under the supervision of an Inspection Organisation approved by the Board for the purpose (see Chapter A7—5) or under the supervision of an appropriately licensed aircraft engineer. Before the work is finally certified, the Chief Inspector of the Approved Inspection Organisation or the licensed aircraft engineer shall satisfy himself that the work has been carried out, inspected and, where necessary, tested in conformity with the specifications, drawings, and instructions relating to the approved design.

2.6 The applicant shall make arrangements for weighing the aircraft and shall prepare the Weight and Centre of Gravity Schedule (see Chapter A5—1).

NOTE : In certain cases, the Board may decide that weighing the aircraft can be dispensed with.

2.7 A certificate of fitness for flight shall be issued and the aircraft shall be tested in flight to schedules approved by the Board (see Chapter A5—2). Particulars and results of such testing shall be provided.

- 2.8 Full particulars of the work done shall be entered in the appropriate log book and a certificate of compliance shall be signed (see Chapter A4—3).
- 2.9 When the particulars of the work done are so voluminous as to render it inconvenient to enter them in the space provided in the log book, these particulars shall be entered in a separate maintenance record which shall be numbered for identification purposes, certified in the same manner as that required for the relevant entry in the log book, and retained in safe custody in order that it may be produced for examination. The reference number of such record, and particulars of the place where it may be examined, shall be inserted in the log book together with a brief description of the work to which the record relates. In the case when aircraft, engine, and propeller log books are not required to be kept, the particulars of the work done and relevant certificate shall be entered in a suitable maintenance record book or folder and held available to the Board for examination.
- 2.10 The applicant shall ensure that Maintenance, Overhaul and Repair Manuals (Chapters A3—4 and A6—2) and the Crew Manual (Chapter A6—7) have been amended to correspond to the physical standard of the aircraft at the time of application.

CHAPTER A2—6

ISSUE OF CERTIFICATE OF AIRWORTHINESS FOR EXPORT

- NOTE : (i) British constructed aircraft, which are to be exported, will be certificated by means of a Certificate of Airworthiness for Export.
- (ii) A recommendation for the issue of a Certificate of Airworthiness for Export will be based on compliance with the procedures outlined in this chapter.

I APPLICATION

- 1.1 C.A. Forms 1241 and 1241A, copies of which may be obtained from the Secretary, Ministry of Aviation, Shell Mex House, London, W.C.2, shall be completed and shall state whether the aircraft is new or used, which categories are required (see Chapter A1—1) and when and where the aircraft will be available for survey.
- 1.2 C.A. Form 1241 shall be returned to the Secretary, Ministry of Aviation, Shell Mex House, London, W.C.2, and C.A. Form 1241A shall be forwarded to the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2. The appropriate fee shall accompany the application sent to the Board.

NOTE : The fees which must accompany C.A. Form 1241A are as follows :—

- (a) For new aircraft, whether Prototype, Prototype (Modified) or Series, the same scale of fees as for the issue of an ordinary certificate of airworthiness.
- (b) For used aircraft, the same scale of fees as for the renewal of an ordinary certificate of airworthiness.

2 GENERAL Where a certificate of airworthiness has already been issued in respect of an aircraft which is subsequently the subject of an application for a Certificate of Airworthiness for Export, the former document, whether still valid or not, shall be returned to the Board with C.A. Form 1241A.

- 2.1 In the case of new aircraft the procedures, as applicable, prescribed in paragraphs 2 to 4, inclusive, of Chapters A2—1 and A2—2, and paragraphs 2 and 3 of Chapter A2—3 shall apply.
- 2.2 In the case of used aircraft the procedures prescribed in paragraph 2 of Chapter A2—5 shall apply in part or in full at the discretion of the Board.

- 2.3 Any installations, equipment, systems, instruments, etc., which may be installed at the request of the purchaser but which constitute derogations from British Civil Airworthiness Requirements shall be declared by the applicant and will be listed on the reverse side of the Certificate of Airworthiness for Export.

NOTE: If an aircraft which is subject to the issue of a Certificate of Airworthiness for Export has previously been registered in the United Kingdom, it must be removed from the Register prior to the issue of the Certificate of Airworthiness for Export.

- 2.4 The Certificate of Airworthiness for Export does not itself cover a foreign registered aircraft for the delivery flight and, before the aircraft to which it relates is flown internationally, the certificate must be validated by the country of registry or replaced by a certificate issued by that country.

CHAPTER A3—I

ENGINES AND THEIR ACCESSORIES

NOTE: (i) Engines and their accessories intended for use in civil aircraft for which a certificate of airworthiness is required, must be of approved types. The approval of such engines and accessories will be based on compliance with the procedures outlined in this chapter.

- (ii) If, as a temporary measure, it is desired to use in such an aircraft an engine, which is not fully approved in accordance with the procedures outlined in this chapter, the status of the engine is to be clearly defined in the log book of the engine concerned (e.g. "This is an experimental engine and shall not be installed in an aircraft holding a current certificate of airworthiness").

1 PROTOTYPE ENGINES MANUFACTURED IN THE UNITED KINGDOM

- 1.1 **Application and Declaration.** A.R.B. Form 501 (for piston engines) or A.R.B. Form 502 (for gas turbine engines), copies of which may be obtained from the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2, shall be completed and returned to the Board.

- 1.2 **Design.** The applicant shall, through the medium of a Design Organisation approved by the Board for the purpose (see Chapter A7—2), ensure that the engine design satisfies:

- (i) The Requirements in force at the time the application for approval is received by the Board.
- (ii) Such other requirements as the Board may notify with respect to the engine design.

- 1.3 **Approval.** On the satisfactory completion of the appropriate tests prescribed in Section C, the Board will notify the applicant of its approval of an engine by letter in the first instance, followed by the issue of an Engine Technical Certificate when the performance of a representative sample of production engines has been reviewed.

NOTE: An Engine Technical Certificate is related to a particular engine type. The applicant for a certificate of airworthiness in respect of an aircraft is responsible for ensuring compliance with the power-plant installation requirements (including the engine installation flight test requirements).

2 PROTOTYPE ACCESSORIES MANUFACTURED IN THE UNITED KINGDOM

The design of prototype accessories shall conform to specifications approved by the Board (see Chapter A6—5), and shall be certified by a Design Organisation approved by the Board for the purpose (see Chapter A7—3).

NOTE: (i) The Board will grant Type Approval to such accessories on satisfactory completion of the necessary tests but before approving an accessory for use in a particular engine further investigation and test (as appropriate to the accessory/engine component) will be required.

- (ii) Unless otherwise agreed by the Board, engine accessories must be listed as part of the engine specification and their modification will be subject to engine modification procedure.

ENGINE NOMENCLATURE

3.1 All engines of the same basic type shall have a common Name and appropriate Mark Number. The Mark Number selected shall differ from that of any similar military engine.

3.2 If the rating of the engine is changed significantly after the engine has been approved, or an important alteration to the physical standard is made, the Mark Number shall also be changed.

4 ENGINES AND ACCESSORIES MANUFACTURED OUTSIDE THE UNITED KINGDOM An engine, or accessory, of a type not previously approved by the Board, but which has been approved by the authorities of the country of manufacture, will be approved subject to compliance with the following procedure :—

4.1 The applicant shall forward to the Board an approval certificate (or its equivalent) issued by the appropriate authority in the country of manufacture, together with particulars of the requirements with which the engine/accessory complies, and such other particulars as may be required by the Board.

NOTE : During the investigation of the engine/accessory, the Board may decide that additional requirements must be met, and the applicant will be informed of such requirements in writing.

5 CONSTRUCTION

5.1 All series and overhauled engines and accessories shall be to the modification standard associated with a currently approved period between overhauls for the engine or accessory concerned.

5.2 All series engines, their components and all series accessories shall be marked with such serial numbers as may be necessary to enable the corresponding inspection records to be adequately co-related.

5.3 All engines and accessories manufactured in the United Kingdom shall be constructed under the supervision of an Inspection Organisation approved by the Board for the purpose (see Chapter A7—5).

5.4 All engines and accessories manufactured outside the United Kingdom shall have been constructed under conditions acceptable to the Board.

6 TESTS

6.1 The applicant shall be responsible for arranging all tests required in connection with airworthiness approval.

6.2 The applicant shall ensure that all test facilities, including all measuring instruments and equipment, are to the satisfaction of the Board.

6.3 At least seven days prior to the commencement of type tests, the applicant shall lodge with the Board for agreement a schedule of the tests proposed. The applicant shall notify the Board of the date on which it is proposed to commence the type tests and this notification shall be despatched so as to reach the Board within the period of not less than two days and not more than five clear working days before that date. At least two days' notice of the strip examination of an engine or accessory which has completed a type test shall be given to the Board's Supervising Surveyor.

6.4 Prior to commencement of acceptance tests of series or overhauled engines, a schedule of the proposed tests shall have been agreed and lodged with the Board.

7 RECORDS

- 7.1 All relevant design information, data, calculations, drawings, and reports on tests, shall be held at the disposal of the Board. No such records shall be destroyed without prior authorisation by the Board.
- 7.2 Each design drawing shall bear a descriptive title, drawing number, issue number and date of issue. All alterations to design drawings shall be made in accordance with a drawing amendment system which ensures design records are suitably amended.
- 7.3 If an alteration is made to a drawing, a new issue number and date shall immediately be allocated to the drawing irrespective of whether the drawing is permanent or experimental. Where an alteration affects the interchangeability of an item in any respect whatsoever, the original part number of the item shall be completely changed to provide positive identification.
- 7.4 The modification standard of each series and overhauled engine and accessory shall be recorded in the log book of the engine concerned.
- 7.5 All relevant inspection records shall be made available to the Board for examination and shall be retained for a period of 5 years (unless earlier disposal is authorised by the Board) but in any case no inspection records shall be destroyed without prior authorisation by the Board.

8 MAINTENANCE, OVERHAUL AND REPAIR MANUALS The appropriate Maintenance, Overhaul and Repair Manuals shall be provided (see Chapter A6—2).**9 SCHEDULED INFORMATION** The applicant shall furnish to the Board such information relating to an engine, as may be required to be scheduled in the documents associated with the certificate of airworthiness.**10 ENGINE INSPECTION AND TEST CERTIFICATE**

- 10.1 The essential data given in a log book for all prototype, series and overhauled engines shall include an Engine Inspection and Test Certificate.
- 10.2 A copy of each completed Engine Inspection and Test Certificate shall be kept by the constructor or person or firm concerned.
- 10.3 The Engine Inspection and Test Certificate should not be larger than eight inches wide by seven inches long, in order that it may be conveniently affixed in a log book of the authorised pattern.
- 10.4 The information given in the Engine Inspection and Test Certificate shall include the following :—
 - (i) The title "Engine Inspection and Test Certificate".
 - (ii) The name of the constructor or overhaul organisation issuing the certificate.
 - (iii) The name of the original constructor and the engine type.
 - (iv) The reference and date of Air Registration Board Approval Letter or the latest issue of the Technical Certificate.
NOTE : If the engine is of foreign origin the corresponding data should be quoted.
 - (v) The constructor's serial number of the engine.
 - (vi) Identification of or reference to the build standard.
 - (vii) Category of release (e.g. B Conditions, Special Category, Transport Category (Passenger) etc.).

(viii) Reference to the constructor's or overhaul organisation's inspection and test records.

(ix) Any special remarks or endorsements, if applicable.

(x) A certificate worded in the following form :—

I hereby certify that the construction/overhaul/repair/modification/inspection/test of the above mentioned engine has been carried out in accordance with the requirements of British Civil Airworthiness Requirements.

(Signed)

(Firm)

A.R.B. Approval Reference.....

Date

NOTE : The above certificate does not replace the Certificate of Compliance where this is required by Chapter A4—3.

II MODIFICATIONS TO ENGINES AND ACCESSORIES

11.1 The approval of the Board shall be obtained for a modification which has not been previously investigated and approved.

11.2 Salvage schemes shall be classified as modifications and wherever possible approved through the medium of the original design office.

NOTE : Installation in an aircraft of a modified engine or accessory constitutes a modification to the aircraft concerned and must be approved in accordance with the procedure detailed in Chapter A4—1.

11.3 The applicant shall (in particular cases through the medium of a design organisation approved by the Board for the purpose) ensure that the proposed modification is such that the design of the engine, or accessory when modified, satisfies :—

(i) The Requirements in force at the time the engine or accessory was originally approved.

(ii) Such other requirements as the Board may notify with respect to the design of the engine, or accessory concerned.

11.4 All relevant information, data, calculations, drawings and reports on tests shall be held at the disposal of the Board. No such design records shall be destroyed without prior authorisation by the Board.

11.5 Each detail drawing shall bear a descriptive title, drawing number, issue number and date of issue. All alterations to drawings shall be made in accordance with a drawing amendment system which ensures that the design records are suitably amended.

11.6 If an alteration is made to a drawing, a new issue number and date shall be immediately allocated to the drawing, irrespective of whether the alteration is permanent or experimental. Where an alteration affects the interchangeability of an item in any respect whatsoever, the original part number of the item shall be completely changed to provide positive identification of the modified part.

11.7 Modification documents shall consist of a Title Sheet which shall bear a modification reference number, issue number and date, and a description of the modification, together with a list of parts and assemblies affected by the modification and, where necessary, drawings giving particulars of the parts before and after modification.

11.8 In the case of modifications classified as mandatory, a date shall be agreed with the Board by which all affected items installed in aircraft are to be notified and this date shall be quoted in modification documents.

- 11.9 Where modifications to approved equipment or assemblies affect unit interchangeability or are of such an extent as to require amendment of approval documents, or any documents associated with the certificate of airworthiness, a separate type or designation reference shall be allocated to the modified equipment or unit assembly.
- 11.10 An Approved Design Organisation may introduce minor modifications without the prior approval of the Board, but in view of the difficulty in defining a minor modification to a dynamic system, the constructor shall, at convenient intervals, obtain the Board's approval for all modifications.
- 11.11 The Board's approval of the modification will, wherever possible, be indicated by the signature of one of its Surveyors on the Modification Title Sheet, preferably on the master tracing.
- 11.12 All work undertaken in the incorporation of a modification to an engine or accessory shall be carried out under the supervision of an Inspection Organisation approved by the Board for the purpose (see Chapter A7—5) or under the supervision of an appropriately licensed aircraft engineer. Before the work is finally certified, the Chief Inspector of the Approved Inspection Organisation, or the licensed engineer, shall satisfy himself that the work has been carried out, inspected and, where necessary, tested in conformity with the specifications, drawings and instructions relating to the approved design.
- 11.13 Full particulars of the work done shall be entered in the appropriate log book, quoting the reference number of the modification. A certificate of compliance shall be signed (see Chapter A4—3).

CHAPTER A3—2

PROPELLERS AND THEIR ACCESSORIES

NOTE : Propellers and their accessories intended for use in civil aircraft for which a certificate of airworthiness is required, must be of approved types. The approval of such propellers and accessories will be based on compliance with the procedures outlined in this chapter.

I PROTOTYPE PROPELLERS MANUFACTURED IN THE UNITED KINGDOM

- 1.1 **Application.** Application for approval of a prototype propeller shall be made by letter addressed to the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2. The application shall be accompanied by a declaration giving the propeller design particulars.
- 1.2 **Design.** The applicant shall, through the medium of a Design Organisation approved by the Board for the purpose (see Chapter A7—2), ensure that the propeller design satisfies :—
- (i) The Requirements in force at the time the application for approval is received by the Board.
 - (ii) Such other requirements as the Board may notify with respect to the propeller design.
- 1.3 **Approval.** The Board will notify the applicant of its approval in writing. Such approval will be related to a particular power plant/aircraft installation.

2 PROTOTYPE ACCESSORIES MANUFACTURED IN THE UNITED KINGDOM

The design of prototype accessories shall conform to specifications approved by the Board (see Chapter A6—5), and shall be certified by a Design Organisation approved by the Board for the purpose (see Chapter A7—3).

NOTE : (i) The Board will grant Type Approval to such accessories on satisfactory completion of the necessary tests but before approving an accessory for use in a particular aircraft further investigation and testing (as appropriate to the accessory/propeller/engine/airframe combination) will be required.

(ii) Unless otherwise agreed by the Board, propeller accessories must be listed as part of the propeller specification and their modification will be subject to propeller modification procedure.

3 PROPELLERS AND ACCESSORIES MANUFACTURED OUTSIDE THE UNITED KINGDOM A propeller or accessory, of a type not previously approved by the Board, but which has been approved by the authorities of the country of manufacture, will be approved subject to compliance with the following procedure :—

3.1 The applicant shall forward to the Board an approval certificate (or its equivalent) issued by the appropriate authority in the country of manufacture, together with particulars of the requirements with which the propeller/accessory complies, and such other particulars as may be required by the Board.

NOTE : During the investigation of the propeller/accessory, the Board may decide that additional requirements must be met, and the applicant will be informed of such requirements in writing.

4 CONSTRUCTION

4.1 All series and overhauled propellers and accessories shall be to the modification standard associated with a currently approved period between overhauls for the propeller or accessory concerned.

4.2 All propellers and accessories manufactured in the United Kingdom shall be constructed under the supervision of an Inspection Organisation approved by the Board for the purpose (see Chapter A7—5).

4.3 All propellers and accessories manufactured outside the United Kingdom shall have been constructed under conditions acceptable to the Board.

5 TESTS

5.1 The applicant shall ensure that compliance with the appropriate Requirements (see Section C) is demonstrated and that any additional flight tests and demonstrations prescribed by the Board are satisfactorily concluded.

5.2 The applicant shall ensure that all test facilities, including all measuring instruments and equipment, are to the satisfaction of the Board.

5.3 Prior to the commencement of type tests, the applicant shall lodge with the Board a schedule of the tests proposed.

6 RECORDS

6.1 All relevant design information, data, calculations, drawings, and reports on tests, shall be held at the disposal of the Board. No such records shall be destroyed without prior authorisation by the Board.

- 6.2 Each design drawing shall bear a descriptive title, drawing number, issue number and date of issue. All alterations to design drawings shall be made in accordance with a drawing amendment system which ensures design records are suitably amended.
- 6.3 If an alteration is made to a drawing a new issue number and date shall immediately be allocated to the drawing, irrespective of whether the drawing is permanent or experimental. Where an alteration affects the interchangeability of an item in any respect whatsoever, the original part number of the item shall be completely changed to provide positive identification of the modified item.
- 6.4 The modification standard of each series and overhauled propeller and accessory shall be recorded in the log book of the propeller concerned.
- 6.5 All relevant inspection records shall be made available to the Board for examination and shall be retained for a period of 5 years (unless earlier disposal is authorised by the Board) but in any case no inspection records shall be destroyed without prior authorisation by the Board.
- 7 MAINTENANCE, OVERHAUL AND REPAIR MANUALS The appropriate Maintenance, Overhaul and Repair Manuals shall be provided (see Chapter A6—2).
- 8 SCHEDULED INFORMATION The applicant shall furnish to the Board such information relating to a propeller, as may be required to be scheduled in the documents associated with the certificate of airworthiness.

MODIFICATIONS TO PROPELLERS AND ACCESSORIES

- 9.1 The approval of the Board shall be obtained for a modification which has not been previously investigated and approved.
- 9.2 Salvage schemes shall be classified as modifications and wherever possible approved through the medium of the original design office.
- NOTE : Installation in an aircraft of a modified propeller or accessory constitutes a modification to the aircraft concerned and must be approved in accordance with the procedure detailed in Chapter A4—1.
- 9.3 The applicant shall (in particular cases through the medium of a design organisation approved by the Board for the purpose) ensure that the proposed modification is such that the design of the propeller or accessory, when modified, satisfies :—
- (i) The requirements in force at the time the propeller or accessory was originally approved.
 - (ii) Such other requirements as the Board may notify with respect to the design of the propeller or accessory concerned.
- 9.4 All relevant design information, data, calculations, drawings and reports on tests shall be held at the disposal of the Board. No such design records shall be destroyed without prior authorisation by the Board.
- 9.5 Each detail drawing shall bear a descriptive title, drawing number, issue number and date of issue. All alterations to drawings shall be made in accordance with a drawing amendment system which ensures that the design records are suitably amended.

- 9.6 If an alteration is made to a drawing, a new issue number and date shall be immediately allocated to the drawing, irrespective of whether the alteration is permanent or experimental. Where an alteration affects the interchangeability of an item in any respect whatsoever, the original part number of the item shall be completely changed to provide positive identification of the modified part.
- 9.7 Modification documents shall consist of a Title Sheet, which shall bear a modification reference number, issue number and date, and a brief description of the modification, together with a list of parts and assemblies affected by the modification and, where necessary, drawings giving particulars of the parts before and after modification.
- 9.8 In the case of modifications classified as mandatory, a date shall be agreed with the Board by which all affected items installed in aircraft are to be modified and this date shall be quoted in modification documents.
- 9.9 Where modifications to approved equipment or assemblies affect unit interchangeability or are of such an extent as to require amendment of approval documents or any documents associated with the Certificate of Airworthiness a separate type or designation reference shall be allocated to the modified equipment or unit assembly.
- 9.10 An Approved Design Organisation may introduce minor modifications without prior approval of the Board but in view of the difficulty in defining a minor modification to a dynamic system, the constructor shall, at convenient intervals, obtain the Board's approval for all modifications.
- 9.11 The Board's approval of the modification will, wherever possible, be indicated by the signature of one of its Surveyors on the Modification Title Sheet, preferably on the master tracing.
- 9.12 All work undertaken in the incorporation of a modification to a propeller or accessory shall be carried out under the supervision of an Inspection Organisation approved by the Board for the purpose (see Chapter A7—5), or under the supervision of an appropriately licensed engineer. Before the work is finally certified, the Chief Inspector of the Approved Inspection Organisation, or the licensed engineer, shall satisfy himself that the work has been carried out, inspected and, where necessary, tested in conformity with the specifications, drawings, and instructions relating to the approved design.
- 9.13 Full particulars of the work done shall be entered in the appropriate log book and a Certificate of Compliance shall be signed (see Chapter A4—3).

CHAPTER A3—3

AIRFRAME PARTS AND EQUIPMENT

NOTE : Certain airframe parts and equipment intended for use in civil aircraft for which certificates of airworthiness are required, must be of approved types. The approval of such items will be based on compliance with the procedures outlined in this chapter.

I DEFINITIONS

- 1.1 **Airframe Parts and Equipment.** These are all parts of, and all items installed in, aircraft, other than engines, propellers or radio.
- 1.2 **Uncontrolled Items.** These are items, the installation or failure of which would not adversely affect the airworthiness or the safe operation of an aircraft, and also those items specifically exempted from approval by the Air Navigation Order. Un-

controlled items, as such, do not require approval but when installed in an aircraft, they must comply with the requirements of paragraph 2.

NOTE : The procedure prescribed in this chapter need not be followed for A.G.S. and similar standard parts. Full details of such parts are published and a Design Organisation accepts the responsibility for their use without reference to the Board.

- 1.3 **Controlled Items.** These are items, prescribed in the Air Navigation Order or the Requirements and, in addition, items on which the airworthiness and safe operation of an aircraft depend. Controlled items must comply with the requirements of paragraph 3.

2 UNCONTROLLED ITEMS

- 2.1 An organisation installing uncontrolled items in aircraft shall ensure that their installation does not adversely affect the airworthiness or safe operation of the aircraft concerned, and that they are so installed that in the event of failure or malfunctioning, they will not endanger the aircraft or its occupants.

- 2.2 An approved design organisation shall certify to the Board as to the safety of all installed uncontrolled items (except those which, in the opinion of the Board, are obviously harmless), and when requested shall supply the Board with a summary of evidence on which the certification was based.

NOTE : For new aircraft types this certification is covered by the usual Certificate of Design for the type. Where items are introduced as modifications, the Board may require a design certificate or, if the items are obviously harmless, may accept their introduction without design certification.

3 CONTROLLED ITEMS

3.1 Construction

- 3.1.1 All items manufactured in the United Kingdom shall, in general, be constructed under the supervision of an Inspection Organisation approved by the Board for that purpose (see Chapter A7—5).

- 3.1.2 All items manufactured outside the United Kingdom shall have been constructed under conditions acceptable to the Board.

NOTE : (i) The acceptance of foreign equipment is based on its acceptance by the responsible authority in the country of manufacture and on the understanding that it conforms broadly to U.K. requirements as to design and quality.

(ii) If its design information cannot be guaranteed by a responsible authority, then sufficient information of its characteristics will have to be provided by inspection and tests by an approved organisation.

(iii) If continuity of quality cannot be guaranteed by a responsible authority, then at least a visual inspection of each complete unit will have to be made by an approved organisation. The necessity for other tests for particular items will also have to be considered.

3.2 Application

- 3.2.1 When items are designed for use in civil aircraft, either the Component Procedure prescribed in paragraph 3.3 or the Accessory Procedure prescribed in paragraph 3.4 shall be followed.

- 3.2.2 When an item is designed for particular use in a particular aircraft type the Component Procedure will usually apply.

- 3.2.3 When the design and performance of an item is closely related to the system in which it is used, the Component Procedure will usually apply.

- 3.2.4 When the item is classed as mandatory equipment as defined in Chapter D6—1, the Accessory Procedure will usually apply.

- 3.2.5 When the item is designed for general use other than as described above, either the Accessory Procedure or the Component Procedure can be applied.
- 3.2.6 Where the Component Procedure is applied, the cost of investigating the component will be charged to the applicant for approval of the design using the component unless other arrangements are agreed between the firms concerned and the Board.
- 3.2.7 Where the Accessory Procedure is applied, an A.R.B. Form 70, copies of which may be obtained from the Board, shall be completed and, together with a deposit fee of £2 2s. 0d., shall be forwarded to the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2. (The Board cannot undertake the investigation until the A.R.B. Form 70 and deposit fee are lodged.) The total fee is based on the cost of the investigation whether formal approval is granted or not and the Board will, during the course, or upon completion, of the investigation, notify the applicant in writing of any further fee which is payable.

3.3 Component Procedure

- 3.3.1 The design and, as necessary, the testing of the item shall be certified by an organisation approved for the design of such items. This organisation shall supply (i) a Type Record and Certificate of Design (in the case of major items) or (ii) a Declaration of Design and Performance or (iii) drawings/specifications and such other information as may be required by the applicant. Where the item complies with the requirements for, and is certified for a particular use in, a particular aircraft this intended use shall be stated.

NOTE : A type record will not normally be required unless the essential information is in the form listed in Chapter A2—1, paragraph 2.6, which renders a Type Record more suitable than a Declaration of Design and Performance.

- 3.3.2 The applicant shall satisfy himself from the Type Record or the Declaration of Design and Performance and any other information or testing he considers necessary, that the item is suitable for use in his aircraft. Items for which design responsibility is *wholly* taken by the designer of the aircraft itself are covered by the usual Certificate of Design and Type Record of the aircraft.

- 3.3.3 Design organisations incorporating items in aircraft or in components shall certify that the items were designed to suitable requirements and that the installation is satisfactory.

- 3.4 **Accessory Procedure.** The item shall conform to a specification (frequently the maker's own specification) acceptable to the Board and shall be certified to the Board by means of a Declaration of Design and Performance by an organisation approved for the design of such accessories. The Board, if satisfied, will then approve the item in relation to the Declaration of Design and Performance. Any aircraft design organisation may then incorporate the apparatus in its aircraft design, provided that the Declaration of Design and Performance shows it to be suitable. The Board shall have the right to disclose the contents of a Declaration of Design and Performance relating to an approved item to parties interested in the installation of such items.

NOTE : The acceptance of commercial equipment is based on fulfilment of the conditions outlined in Notes (ii) and (iii) following paragraph 3.1.2.

- 4 **PROVISIONAL APPROVAL** Where it is necessary to obtain further experience before granting formal approval under the Accessory Procedure, provisional approval may be granted. In general, this provisional approval will be limited to approval for use in a particular aircraft type and will only be granted when there is reason to suppose that items so provisionally approved will, in due course, qualify for formal approval. Provisional approval will not be granted unless a Declaration of Design and Performance

detailing *inter alia* any limitations which prevent the granting of full approval is available to the Board and the user.

NOTE : Because an accessory holds provisional approval it does not follow that formal approval is a foregone conclusion ; in most cases it indicates that sufficient evidence for formal approval has not been established.

5 DECLARATION OF DESIGN AND PERFORMANCE

5.1 A standard form of Declaration of Design and Performance is given in British Standard 2G.100 : Part 1, entitled, "Declarations, Identifications and Construction," and this will require to be adapted according to the nature of the equipment. The Declaration shall contain the following information :—

- (i) Particulars identifying the equipment and its design standard and including reference to the specification(s) (Chapter A6—6) to which it is designed, and a record of drawings.
- (ii) The rated performance of the equipment, either directly or by reference to other supplementary documents where necessary.
- (iii) The degree of compliance with the Requirements stating the issue number of the Section concerned.
- (iv) References to relevant test reports.
- (v) Any limiting conditions applying to its use. This shall include limitations implicit in the design (e.g. working and ultimate pressures or loads, working and maximum voltage currents, rating, accuracy of instruments), declarations required by the governing specifications (e.g. by British Standard 2G.100) and the ability of the equipment to work under various ambient conditions (e.g. acceleration, vibration, temperature, altitude and humidity).

NOTE : For example, an item of electrical equipment may require the following information regarding limitations :—

- (a) Voltage range,
- (b) Frequency range,
- (c) Time rating,
- (d) Ambient temperature range appropriate to rating,
- (e) Climatic grading as defined in British Standard G.100,
- (f) Altitude rating,
- (g) Vibration Grade, Acceleration Grade, whether flameproof, and/or flame resistant, Compass Safe Distance, and whether Radio Interference free, all as defined in British Standard G.100,
- (h) Endurance life in hours or cycles of operation,
- (j) Limitations in mounting attitude,
- (k) Any departures from the governing specification(s).

5.2 The Declaration shall bear the following statement made and signed by the Chief Designer or his designated representative :—

"I hereby certify that the information contained in this Declaration of Design and Performance is accurate and is made under the authority of the Air Registration Board Approval AD/—/—..... Limited cannot accept responsibility for the satisfactory operation of equipment used outside the conditions given above without their agreement."

6 MANUALS

6.1 Where items are approved under the Accessory Procedure, the applicant for approval shall provide the appropriate Maintenance, Overhaul and Repair Manuals (see Chapter A6—2).

- 6.2 Where items are approved under the Component Procedure, the aircraft design organisation, in conjunction with the component design organisation, shall prepare the Maintenance, Overhaul and Repair Manuals or such parts thereof as are appropriate (see Chapter A6—2).

7 MODIFICATIONS

- 7.1 Modifications to approved accessories and components may affect their approval, and design organisations shall immediately notify the Board of improvements or modifications which affect airworthiness or where a new "Mark" is introduced. Where applicable, A.R.B. Form 70 shall be completed and forwarded to the Board, together with a deposit fee of £2 2s. 0d.
- 7.2 Where modifications to accessories or components affect interchangeability or are of such an extent as to affect the accuracy of the information in the Declaration of Design and Performance, the Type Record, or other specifications, drawings, documents containing approval particulars, or the Manuals, a separate type or designation reference shall be allocated to the modified equipment and the documents shall be amended as necessary.
- 7.3 **Records.** Organisations shall keep a book record of all modifications so that this may be periodically inspected by the Board.

CHAPTER A3—4

RADIO APPARATUS

NOTE: This Chapter A3—4 applies to radio and radar apparatus i.e. apparatus concerned with free-space electromagnetic waves. The term radio apparatus is intended to include such associated devices as aerials, transducers, service selection systems, radio navigational computers, display systems and power supply units concerned with the radio station.

I APPARATUS MANUFACTURED IN THE UNITED KINGDOM

- 1.1 A.R.B. Form 70, copies of which may be obtained from the Board, shall be completed and, together with a deposit fee of £2 2s. 0d., a specification of the apparatus and all available data, shall be sent to the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2. (The Board cannot undertake the investigation until the A.R.B. Form 70 and deposit fee are lodged.) The total fee is based on the cost of the investigation whether formal approval is granted or not and the Board will, during the course or upon completion of the investigation, notify the applicant in writing of any further fee which is payable.
- 1.2 The apparatus shall conform to a specification (frequently to the maker's own specification) acceptable to the Board and shall be certified to the Board as complying with a Declaration of Design and Performance by an organisation approved for the design of radio apparatus. The Board, if satisfied, will then approve the item in relation to this Declaration. Any aircraft Design Organisation may then incorporate the apparatus in its aircraft design provided that the Declaration of Design and Performance shows it to be suitable and provided that the declared limitations of the device are observed on installation. The Board shall have the right to disclose the contents of a Declaration of Design and Performance relating to an approved item to other parties it considers to be concerned.

1.3 The Declaration shall contain the following information :—

- (i) Particulars identifying the equipment and its design standards including reference to the specification(s) to which it is designed and drawing records.
- (ii) The equipment performance specification, either directly or by reference to other supplementary documents where necessary.
- (iii) The degree of compliance with the Requirements stating the issue number of the Section concerned and the Chapter and paragraph references.
- (iv) Reference to relevant test reports.
- (v) Reference to associated items of apparatus.
- (vi) Any limiting conditions applying to its use. This should include limitations implicit in the design declarations required by the governing specification and the ability of the equipment to work under various conditions. For example, an item of radio apparatus may require the following information regarding limitations :—
 - (a) Supply Voltage Range (including resistance to transients)
 - (b) Supply Frequency Range
 - (c) Duty cycle or time rating
 - (d) Ambient Temperature Range
 - (e) Altitude Rating
 - (f) Ambient Temperature Range appropriate to Rating
 - (g) Climatic Grading (according to British Standard 2G. 100)
 - (h) Vibration and Acceleration Gradings (according to British Standard 2G. 100)
 - (i) Flameproofness, fire resistance and noxious fume risk
 - (j) Compass Safe Distance
 - (k) Mounting limitations
 - (l) Any departures from governing specifications.
- (vii) A design estimate of mean time between failures.
- (viii) Any alteration in the basic performance characteristics which could occur because of variations in ambient conditions, power supply and the like.
- (ix) Any other characteristic which needs to be known by the aircraft designer.

1.4 The Declaration shall bear the following statement made and signed by the Chief Designer :—

“I hereby certify that the information contained in this Declaration of Design and Performance is accurate and is made under the authority of the Air Registration Board Design Approval AD/—/—.....Ltd. will not accept responsibility for the satisfactory operation of equipment used in conditions other than given above without their agreement.”

2 TESTS

- 2.1 The applicant shall be responsible for all tests in connection with approval and for any damage to apparatus resulting directly or indirectly therefrom.
- 2.2 All test facilities, including all measuring instruments and equipment, shall be satisfactory to the Board.
- 2.3 The Approval Test Schedule shall be agreed with the Board before the tests are started.

- 2.4 The applicant shall make suitable arrangements to allow the Board's representatives to witness any tests.
- 2.5 A Test Report shall be prepared by the applicant for all apparatus submitted for approval.
- 2.6 Where the performance of apparatus under flight conditions cannot be properly assessed from laboratory tests, the Board may require flight tests.

3 APPARATUS MANUFACTURED OUTSIDE THE UNITED KINGDOM

- 3.1 The acceptance of foreign manufactured equipment is based upon an examination of its characteristics to determine equivalence with British Civil Airworthiness Requirements and other U.K. requirements as to design and quality.
- 3.2 A.R.B. Form 70, copies of which may be obtained from the Board, shall be completed and, together with a deposit fee of £2 2s. 0d., shall be sent to the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2. (The Board will not undertake the investigation until the A.R.B. Form 70 and deposit fee are lodged.) The total fee is based on the cost of investigation whether formal approval is granted or not and the Board will, during the course or upon completion of the investigation, notify the applicant in writing of any further fee which is payable.
- 3.3 The following information is required as a minimum for initial support of an application in respect of foreign manufactured equipment :—
 - (a) Evidence as to whether the equipment is of a type approved by the competent authority of the State in which it is manufactured and a copy of the equipment type approval test report.
 - (b) The approved standards to which the equipment has been certified together with a Declaration of Design and Performance in accordance with paragraph 1.3 stating the equipment performance characteristics and the limiting ambient conditions in which the equipment is designed to operate.
 - (c) Two copies of the relevant operating, maintenance, overhaul and installation manuals.
 - (d) Two copies of the equipment production test specification and evidence of the quality control techniques used in production.
- 3.4 Should the design information of the equipment not be guaranteed by the competent authority of the State in which the equipment is manufactured or is insufficient to determine its suitability in the light of British Civil Airworthiness Requirements or other U.K. requirements, the Board shall have the right to make such further investigations and cause such further tests to be made as may be deemed necessary.
- 3.5 It is the responsibility of the applicant to provide all information required to support an application for approval of foreign manufactured equipment. An English translation of this information shall be provided if required. In cases where the applicant is not the equipment manufacturer or designer, the Board reserves the right to approach the equipment manufacturer or designer concerned directly on any matters affecting the equipment.
- 3.6 Where continuity of quality cannot be guaranteed by a responsible authority in the State in which the equipment is manufactured, then series inspection and testing may be required in the United Kingdom.

- 3.7 The Board will notify the applicant of any approval of the apparatus. The applicant shall be responsible for ensuring that the Board is advised of all modifications concerned with the equipment.

4 SERIES APPARATUS

- 4.1 Series apparatus manufactured in the United Kingdom shall be certified by an Inspection Organisation approved by the Board for the purpose (see Chapter A7—5).
- 4.2 The Schedule of tests and inspection to be carried out on series apparatus shall be kept by the Design Organisation as part of the design record.
- 4.3 Each separate significant unit of apparatus shall be clearly marked as follows :—
Name of Manufacturer
Manufacturer's Type Designation
Manufacturer's Serial Number
Power Supply Characteristics
The Compass Safe Distance when this exceeds 1 ft.
Any special feature of installation such as the necessity for anti-vibration mounts or specific orientation shall be indicated.

5 OVERHAULS, REPAIRS, REPLACEMENTS AND MODIFICATIONS TO RADIO APPARATUS

- 5.1 Approval in writing shall be obtained from the Board for all modifications to approved apparatus.
- 5.2 In the case of modifications which affect the performance or other airworthiness characteristics of the item, an A.R.B. Form 70 shall be completed and forwarded to the Board, together with the deposit fee of £2 2s. 0d.
- 5.3 At an early stage in the design, two copies of the modification details shall be forwarded to the Board.
- 5.4 Where modifications to apparatus affect the accuracy of the information in the Declaration of Design and Performance or the Manuals, these documents must be amended.
- 5.5 Modification documents shall bear a modification reference number, issue number and date, a description of the modification and, where necessary, drawings giving particulars of the parts before and after modification.
- 5.6 In the case of modifications classed as mandatory, a date shall be agreed with the Board by which all affected apparatus is to be modified, and this date shall be appropriately promulgated by the Design Organisation concerned.
- 5.7 All work shall be carried out under the supervision of an Inspection Organisation approved by the Board for the purpose (see Chapter A7—5) or under the supervision of an appropriately licensed engineer. Before the work is finally certified, the Chief Inspector of the Approved Inspection Organisation or the licensed engineer shall satisfy himself that the work has been carried out, inspected, and, where necessary, tested in conformity with the specifications, drawings and instructions relating to the approved modification or design.

- 5.8 Full particulars of the work done shall be entered in a suitable book and a Certificate of Compliance shall be signed (see Chapter A4—3).

6 MANUALS

- 6.1 For every item of apparatus for which approval is sought, the manufacturer shall provide adequate Maintenance, Overhaul and Repair Manuals.
- 6.2 The Board reserves the right to investigate the content of any manual and to require the embodiment of any amendment considered necessary.
- 6.3 At the time of the introduction of approved apparatus into service, amendments must be to the standard of completion as agreed with the Board and available for issue at that time. Thereafter the manufacturer shall review certified manuals at periods not exceeding six months, taking into account any changes which may affect safe operation, maintenance, overhaul and repair, and shall publish amendments corresponding to modifications approved during the period since review.
- 6.4 Certified amendments shall be circulated by the manufacturer to registered holders of equipment manuals together with the necessary instructions for embodiment and recording in the manuals. Each manual shall contain a statement which will indicate that the inclusion of an uncertified amendment will invalidate the initial certification of the manual. In order that essential information can be published between the six-monthly review period, a serialised system for temporary revision shall be provided; these revisions shall be certified and be subsequently embodied in the permanent amendment procedure.
- NOTE : The equipment manufacturer will normally be responsible for issuing certified amendments to manuals in respect of modifications initiated by him or alterations to published procedure where this may affect the safety or efficiency of the equipment. It will be the responsibility of those concerned with the overhaul and repair of equipment to make the necessary arrangements with the equipment manufacturer to ensure receipt of amendments to those manuals together with any Service Bulletins that may be issued from time to time.
- 6.5 Amendments to approved manuals may be carried out by an approved Design Organisation other than the manufacturer of the equipment, provided that the amendment has the approval of the Board.
- 6.6 Maintenance, Overhaul and Repair Manuals shall be adequately illustrated and include the information, as applicable, given in the Appendix to this chapter.

7 CONSTRUCTION

- 7.1 Series and modified equipment shall be constructed under the supervision of an Inspection Organisation approved by the Board for the purpose (see Chapter A7—5).
- 7.2 The apparatus shall be held at the disposal of the Board during construction so that the Board may carry out such inspections as it considers necessary.

8 RECORDS

- 8.1 All relevant design information, data, calculations, drawings and reports on tests shall be held at the disposal of the Board. No such records shall be destroyed without prior authorisation by the Board.

- 8.2 Organisations shall keep a book record of all modifications so that this may be periodically inspected by the Board.
- 8.3 Each drawing shall bear a descriptive title, drawing number, issue number and date of issue. All alterations to design drawings shall be made in accordance with a drawing amendment system which ensures design records are suitably amended.
- 8.4 If an alteration is made to a drawing, a new issue number shall be allocated to the drawing and the date amended, irrespective of whether the drawing is permanent or experimental. Where an alteration affects the interchangeability of an item in any respect whatsoever, the original part number shall be completely changed to provide positive identification of the modified item.

APPENDIX TO CHAPTER A3—4

1 MAINTENANCE MANUAL

- 1.1 Description and Operation.
- 1.2 Data.
- 1.3 Unpacking.
- 1.4 Acceptance Checks.
- 1.5 Storage Instructions.
- 1.6 Checks/Tests before Installation.
- 1.7 Operating Instructions.
- 1.8 Maintenance Schedule (recommended).
- 1.9 Faults, Causes and Rectifications.
- 1.10 Removal.
- 1.11 Bench Checks.
- 1.12 Overhaul Periods (recommended).
- 1.13 Return to Manufacturer or Base.

2 OVERHAUL MANUAL

- 2.1 Introductory Data and Operating Instructions.
- 2.2 Description and Operation.
- 2.3 Circuit and Wiring Diagrams.
- 2.4 Test Apparatus.
- 2.5 Routine Overhaul.
- 2.6 Electro-Mechanical Adjustments, Testing and Maintenance.
- 2.7 Alignment, Adjustment and Performance Tests.
- 2.8 Minimum Performance Specification.
- 2.9 Fault Finding.
- 2.10 Storage Instructions.
- 2.11 Parts List.

CHAPTER A3—5

AIRCRAFT RADIO STATIONS

1 RADIO STATION LICENCE An application form, copies of which may be obtained from the General Post Office, Aircraft Licensing Division (Radio Services Dept.), G.P.O. Headquarters Building, St. Martin's-le-Grand, London, E.C.1, shall be completed and returned to that address. The G.P.O. will forward to the applicant a licence which

only becomes valid when accompanied by a Certificate of Approval of Aircraft Radio Installation issued by the Board, except that the station may be used during test flights in the United Kingdom in accordance with the terms of the licence in the absence of the said certificate.

2 APPROVAL OF A RADIO STATION

2.1 Design

2.1.1 The applicant shall ensure that the design of the installation satisfies :—

- (i) The Requirements in force at the time the application is received by the Board.
- (ii) Such other requirements as may be considered by the Board to be appropriate to a particular installation.

2.1.2 Each drawing shall bear a descriptive title, drawing number, issue number and date of issue. If an alteration is made to a drawing a new issue number and the date shall be allocated to the drawing, irrespective of whether the alteration is permanent or experimental.

2.1.3 Where an alteration affects the interchangeability of an item in any way whatsoever, the original part number of the item shall be completely changed to provide positive identification.

2.2 Survey, Ground and Flight Tests

2.2.1 The approval of an aircraft radio station is based on a survey of the station by the Board, followed by a test flight and such ground tests as may be required in respect of the particular station, to prove the satisfactory functioning of the radio apparatus.

2.2.2 The applicant shall arrange with the Board's Surveyor (Radio), in the appropriate area, a convenient time, date and place for making the survey.

2.2.3 The applicant shall carry out the test flight as detailed in the current issue of the U.K. Air Pilot (COM Section), together with such tests as may be required in respect of the particular radio installation.

2.3 **Flight Test Report.** On the satisfactory completion of the survey and test flight, a Flight Test Report shall be forwarded to the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2. The Flight Test Report shall include information under the following headings, together with such additional information as the Board may require in any particular case.

PARTICULARS OF RADIO STATION

Type and registration marks of aircraft.

CONDITIONS OF TEST FLIGHT

Date and time of test, Log of aircraft's position and height, and Log of radio tests including particulars of aerials, and transmitter used.

FLIGHT TEST CERTIFICATE

A certificate in the following form, signed by the Pilot and/or Radio Operator at the conclusion of the flight tests :—

I hereby certify that, with the exceptions stated below, the above designated radio station has, in every respect, been proved to perform satisfactorily in flight the functions for which it was designed.

Signed.....
Date

- 2.4 **Notification of Approval.** Approval of the radio station will be signified by the issue of a Certificate of Approval of Aircraft Radio Station.

3 MODIFICATIONS TO AIRCRAFT RADIO STATIONS Any modification to an aircraft radio station must be approved in writing and shall be designed and tested with the purpose of ensuring that it satisfies :—

- (i) The Requirements in force at the time the station was originally approved.
- (ii) Such other requirements as the Board may notify with respect to the design of the installation.

NOTE : The procedure for the approval of modifications to aircraft (including radio stations) is prescribed in Chapter A4—1.

4 CHANGE OF OWNERSHIP. A change of aircraft ownership invalidates the radio station licence and the new owner shall apply to the G.P.O. for a new licence.

CHAPTER A4—1

MODIFICATIONS TO AIRCRAFT

NOTE : "Modifications to aircraft" are changes made to a particular aircraft including its components, engines, propellers, radio stations, accessories, instruments, equipment, and their installation, after issue or validation of the certificate of airworthiness. Approval of such modifications, which include changes in the type of components, engines, propellers, radio stations, accessories, instruments and equipment, will be based on compliance with the procedures outlined in this chapter.

I MODIFICATIONS NOT PREVIOUSLY INVESTIGATED AND APPROVED

- 1.1 The written approval of the Board shall be obtained for a modification which has not been previously investigated and approved.

- 1.2 At an early stage of the design of a modification, brief particulars shall be furnished to the Board so that the modification may be classified.

NOTE : (i) A modification will be classified as Minor or Major according to the nature and extent of the Board's investigation in connection with approval. Where amendment of the particulars given in the Certificate of Airworthiness or associated documents requires investigation (even though no physical change to the aircraft is involved) the Board may require major modification procedure to be followed if the changes being proposed are significant.

- (ii) If the design changes are such that the Board requires the aircraft to be investigated as a prototype (modified) aircraft, the procedure of Chapter A2—2 will apply.

- 1.3 The applicant shall (in particular cases, through the medium of a Design Organisation approved by the Board for the purpose) ensure that the proposed modification is such that the design of the aircraft when modified, satisfies :—

- (i) The Requirements in force at the time the aircraft type was originally certificated.
- (ii) Such other requirements as the Board may notify with respect to the aircraft design.

- 1.4 All relevant design information, data, calculations, drawings, and reports on tests shall be held at the disposal of the Board. No such design records shall be destroyed without prior authorisation by the Board.

- 1.5 Each design drawing shall bear a descriptive title, drawing number, issue number and date of issue. All alterations to design drawings shall be made in accordance with a drawing amendment system which ensures that the design records are suitably amended.

- 1.6 If an alteration is made to a drawing a new issue number and the date shall be allocated to the drawing, irrespective of whether the alteration is permanent or experimental. Where an alteration affects the interchangeability of an item in any respect whatsoever, the original part number shall be completely changed to provide positive identification of the modified item.
- 1.7 Modification documents shall bear a modification reference number, issue number and date, a brief description of the modification, together with a list of parts and assemblies affected by the modification and, where necessary, drawings giving particulars of the parts before and after modification.
- 1.8 In the case of modifications classified as mandatory, a date shall be agreed with the Board by which all affected items installed in aircraft are to be modified and this date shall be quoted in modification documents.
- 1.9 Where modifications to approved equipment or assemblies affect unit interchangeability or are of such extent as to require amendment of approval documents or any documents associated with the Certificate of Airworthiness a separate type or designation reference shall be allocated to the modified equipment or unit assembly.
- 1.10 In the case of a modification classified by the Board as Major :—
 - (i) A.R.B. Form 282, copies of which may be obtained from the Board, shall be completed and together with a deposit fee of £5 5s. 0d. shall be forwarded to the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2. (The Board cannot undertake the investigation until the A.R.B. Form 282 and deposit fee are lodged.) As the total fee is based on the cost of the investigation, the Board will, during the course or upon completion of the investigation, notify the applicant in writing of any further fee which is payable.
 - (ii) The Board may require a Certificate of Design to be furnished by an Approved Design Organisation ; the certificate worded in the following form shall be signed by the Chief Designer :—

CERTIFICATE OF DESIGN

Aircraft Type.....
Registration Marks.....
Constructor's Serial Number of the Aircraft.....
Classification in Certificate of Airworthiness
Categories.....
Engine(s) type.....

I hereby certify that except for the differences resulting from the modification(s) listed below, the design of the above aircraft has not been changed in any way.

Modification(s).....
.....
.....
.....

I further certify that with the exceptions listed below, the design of the modified aircraft complies with the Board's requirements as far as this particular type of aircraft is concerned.

Exceptions.....

.....

.....

.....

(Signed)

(Firm)

A.R.B. Approval Ref. No.....

Date.....

- (iii) The Board may require an Addendum to the Type Record to be prepared by an Approved Design Organisation. The Addendum shall contain particulars of design changes made and all consequent changes to the information given under each heading of the relevant Type Record.

1.11 When the design of a modification is undertaken by an Approved Design Organisation, a record of the following particulars shall be prepared and kept in a book or folder bearing the title "Civil Modification Record" and marked with an identification number :—

(i) Aircraft Type.

(ii) Title and Brief Description of Modification.

(iii) Modification Reference Number.

(iv) Modification Class.

(v) Airworthiness Approval Note Number (in the case of a Major Modification).

(vi) Reference to the associated Flight Manual Amendment Number.

(vii) Reference to the associated Maintenance, Overhaul and Repair Manuals, and Crew Manual amendment numbers.

The Civil Modifications Record shall be made available to the Board for examination.

1.12 In the case of a modification classified as Minor and the design of which is not undertaken by an Approved Design Organisation, the Board will record the approval of the modification on an A.R.B. Form 261 and a copy of this completed form will be issued to the applicant.

1.13 In the case of a modification classified as Major, the Board will record the approval of the modification by raising an Airworthiness Approval Note and a copy of the relevant Airworthiness Approval Note will be issued to the applicant.

1.14 The aircraft shall be made available so that the Board may carry out such check inspections as it considers necessary.

1.15 All relevant inspection records shall be made available to the Board for examination and shall be retained for a period of 5 years (unless earlier disposal is authorised by the Board) but in any case no inspection or maintenance records shall be destroyed without prior approval of the Board.

1.16 If the modification affects the information given in the Flight Manual, Maintenance, Overhaul and Repair Manuals, the Crew Manual or Maintenance Schedule, this should be stated on the application. Where the contents of the Maintenance, Overhaul and Repair Manuals, the Crew Manual or the Maintenance Schedule are affected, the

applicant shall prepare and certify an appropriate amendment (Chapters A3—4, A6—2 and A6—7) or shall submit details of the proposed amendment to the Board for approval. Each copy of an approved manual amendment shall bear a serial number or reference number. The procedure relative to Flight Manuals is referred to in Chapter A6—1, paragraph 3.3.2.

- 2** **MODIFICATIONS ALREADY INVESTIGATED AND APPROVED** Modifications which have already been investigated and approved by the Board in writing in respect of a particular aircraft may be incorporated in other aircraft of the same type, unless the approval makes a stipulation to the contrary, subject to compliance with the procedure outlined in paragraph 3.

3 **GENERAL**

3.1 All work undertaken in the incorporation of a modification to an aircraft shall be carried out under the supervision of an Inspection Organisation approved by the Board for the purpose (see Chapter A7—5) or under the supervision of an appropriately licensed aircraft engineer. Before the work is finally certified the Chief Inspector of the Approved Inspection Organisation or the licensed aircraft engineer shall satisfy himself that the work has been carried out, inspected and, where necessary, tested in conformity with the specifications, drawings and instructions relating to the approved design.

3.2 According to the nature of the modifications made to the aircraft :—

- (i) The aircraft shall be weighed and the Weight and Centre of Gravity Schedule shall be amended or replaced by a revised Schedule (see Chapter A5—1).
- (ii) A certificate of fitness for flight shall be issued and the aircraft shall be tested in flight (see Chapter A5—2). Particulars and results of such testing shall be provided.

3.3 If, due to a modification made to an aircraft, the particulars given in the Certificate of Airworthiness or Flight Manual require to be amended, the Certificate or Manual shall be forwarded to the local area office of the Board.

3.4 If, due to a modification made to an aircraft, the particulars given in the Maintenance, Overhaul and Repair Manuals or the Crew Manual require to be amended, such amendments shall be certified by the approved Design Organisation (see Chapters A6—2 and A6—7).

3.5 Full particulars of the work done shall be entered in the appropriate log book, quoting in addition, the reference number of the Airworthiness Approval Note, A.R.B. Form 261, or Civil Modifications Record approving the modification. A Certificate of Compliance shall be signed (see Chapter A4—3).

3.6 When the particulars of the work done are so voluminous as to render it inconvenient to enter them in the space provided in the log book, these particulars shall be entered in a separate maintenance record which shall be numbered for identification purposes, certified in the same manner as that required for the relevant entry in the log book and retained in safe custody in order that it may be produced for examination. The reference number of such record and particulars of the place where it may be examined, shall be inserted in the log book together with a brief description of the modification

to which the record relates. In the case when aircraft, engine, and propeller log books are not required to be kept, the particulars of the modification and relevant certificate shall be entered in a suitable maintenance record book or folder and held available to the Board for examination.

4 MANDATORY MODIFICATIONS

- 4.1 Modifications will be classified as mandatory by the Board in consultation with the Approved Design Organisation and, at the same time, the latest date for embodiment will be decided.

NOTE : In deciding dates of embodiment, the degree of urgency and the availability of modified parts, and factors affecting their delivery will be taken into account.

- 4.2 The initial notification of mandatory modifications shall be through the manufacturer's documents prepared and issued under the authority of the Approved Design Organisation which shall be distributed by the manufacturer to all Operators of his aircraft and to all Airworthiness Authorities to whom these Operators are responsible. In cases where the manufacturer no longer retains accurate records as to the ownership of his aircraft, the information on mandatory modifications shall continue to be distributed to Operators of his aircraft which are on the United Kingdom Register and to the Airworthiness Authorities of contracting States together with any other State in which his aircraft are known to be operating.

- 4.3 The manufacturers' documents shall specify the latest date of embodiment of the modification, and the Board's approval of the classification of the modification shall be signified by a statement appearing on the document in the following manner :—

"This modification has been classified as mandatory by the Air Registration Board."

NOTE : The information referred to in the above paragraphs is summarised by the Board in a document under the title of "Mandatory Aircraft Modifications and Inspections Summary". This summary is kept up to date by the issue of amendments at intervals of approximately three months. One copy of the summary and amendments are supplied on a complimentary basis to each Airworthiness Authority, each Operator of Public Transport Aircraft on the United Kingdom Register, and to each organisation approved for the overhaul and repair of aircraft. Additional copies of the summary and amendments may be obtained from the Board on payment of an annual subscription, and details of this scheme will be supplied on request to the Technical Publications Department, Air Registration Board, Greville House, 37 Gratton Road, Cheltenham, Glos.

CHAPTER A4-2

INSPECTIONS, OVERHAULS, REPAIRS AND REPLACEMENTS TO AIRCRAFT

NOTE : (i) The procedures outlined in this chapter apply to overhauls, repairs and replacements made to an aircraft after issue or validation of the certificate of airworthiness and to those inspections summarised by the Board in a document entitled "Mandatory Aircraft Modifications and Inspections Summary".

- (ii) References to an overhaul, repair or replacement to an aircraft include references to an overhaul, repair or replacement to its components, engines, propellers, radio, accessories, instruments, equipment, and their installation.

I GENERAL

- 1.1 Overhauls and replacements shall be made at such periods as are specified in the relevant approved Maintenance Schedules or Maintenance, Overhaul and Repair Manuals, or, in particular cases, at such periods as may be prescribed by the Board.
- 1.2 The Chief Inspector of the organisation or the aircraft engineer referred to in paragraph 1.3, shall, in the case of structural repairs to an aircraft, advise the nearest representative of the Board of the nature of the repairs.

- 1.3 All work undertaken to maintain the airworthiness of the aircraft shall be carried out under the supervision of an Inspection Organisation approved by the Board for the purpose (see Chapter A7-5) or under the supervision of an appropriately licensed aircraft engineer. Before the work is finally certified, the Chief Inspector of the Approved Inspection Organisation or the licensed aircraft engineer shall satisfy himself that the work has been carried out, inspected and, where necessary, tested in conformity with the specifications, drawings and instructions relating to the approved design.
- 1.4 According to the nature of the overhaul, repair, or replacement made to the aircraft :—
- (i) The aircraft shall be weighed and the Weight and Centre of Gravity Schedule shall be amended or replaced by a revised Schedule (see Chapter A5-1).
 - (ii) A certificate of fitness for flight shall be issued and the aircraft shall be tested in flight (see Chapter A5-2). Particulars and results of such testing shall be provided,
- 1.5 Full particulars of the work done shall be entered in the appropriate log book and a Certificate of Compliance shall be signed (see Chapter A4-3).
- 1.6 When the particulars of the work done are so voluminous as to render it inconvenient to enter them in the space provided in the log book, these particulars shall be entered in a separate maintenance record which shall be numbered for identification purposes, certified in the same manner as that required for the relevant entry in the log book, and retained in safe custody in order that it may be produced for examination. The reference number of such record, and particulars of the place where it may be examined, shall be inserted in the log book together with a brief description of the work to which the record relates. In the case when aircraft, engine and propeller log books are not required to be kept, the particulars of the work done and relevant certificate shall be entered in a suitable maintenance record book or folder and held available to the Board for examination.
- 1.7 Every log book, maintenance record book or folder shall be preserved by the operator of the aircraft until a date two years after the aircraft, engine or variable pitch propeller, as the case may be, has been destroyed or has been permanently withdrawn from use.

CHAPTER A4-3

CERTIFICATION OF INSPECTIONS, OVERHAULS, REPAIRS, REPLACEMENTS AND MODIFICATIONS TO AIRCRAFT

NOTE : This chapter applies to the certification of the inspection, overhaul, repair, replacement and modification of an aircraft including its components, engines, propellers, radio, accessories, instruments, equipment and their installation.

GENERAL Aircraft in respect of which a certificate of airworthiness or a certificate of validation is in force shall not fly if any part of the aircraft or such of its equipment as is necessary for the airworthiness of the aircraft, has been inspected, overhauled, repaired, replaced or modified unless there is in force a Certificate of Compliance relating to the inspection, overhaul, repair, replacement or modification, as the case may be.

NOTE : The inspections to which this Chapter relates are mandatory inspections. They must, on the authority of the Board, be enforced to ensure continued airworthiness.

- 2 ISSUE OF A CERTIFICATE OF COMPLIANCE** A Certificate of Compliance means a certificate that the part of the aircraft or its equipment has been overhauled, repaired, replaced or modified, as the case may be, in a manner and with material of a type approved by the Board and, in relation to an inspection required by the Board, that this has been carried out in accordance with the requirements of the Board. To this end the Board requires that :—

2.1 Inspections. Inspections shall be carried out in accordance with the instructions issued relative thereto and any consequential modification, overhaul, repair or replacement shall be carried out in accordance with the requirements of paragraphs 2.2 to 2.5, as applicable.

2.2 Overhauls. The overhaul shall be carried out in accordance with the approved Overhaul Manual relative thereto in conjunction with any other related information contained in other documents recognised or approved by the Board.

2.2.1 Any materials used in relation to the overhaul shall be in accordance with the requirements of Chapter A6—6, and shall be certified by an Approved Inspection Organisation in accordance with the requirements of Chapter A7—5.

2.2.2 Any tests necessary to ensure correct functioning after overhaul shall be carried out.

2.3 Repairs. Repairs shall be carried out in accordance with the approved Repair Manual or approved repair drawings relative thereto in conjunction with any other related information contained in other documents recognised or approved by the Board.

2.3.1 Any materials used in effecting the repair shall be in accordance with the requirements of Chapter A6—6, and shall be certified by an Approved Inspection Organisation in accordance with the requirements of Chapter A7—5.

2.3.2 Any tests necessary to ensure correct functioning after repair shall be carried out.

2.4 Replacements. Replacements shall be carried out in accordance with the approved manuals, schedules or drawings relative thereto in conjunction with any other related information contained in other documents recognised or approved by the Board.

2.4.1 Replacement parts shall be certified by an Approved Inspection Organisation in accordance with the requirements of Chapter A7—5 or by an alternative procedure approved by the Board.

2.4.2 Any material used in effecting the replacement shall be in accordance with the requirements of Chapter A6—6 and shall be certified by an Approved Inspection Organisation in accordance with the requirements of Chapter A7—5.

2.4.3 Any tests necessary to ensure correct functioning after replacement shall be carried out.

2.5 Modifications. Modifications shall be carried out in accordance with approved drawings and/or associated documents relative thereto. The Board's Requirements for the approval of modifications are given in Chapter A4—1.

2.5.1 Any part used in effecting a modification shall be certified by an Approved Inspection Organisation in accordance with the requirements of Chapter A7—5 or by an alternative procedure approved by the Board.

2.5.2 Any material used in effecting the modification shall be in accordance with the requirements of Chapter A6—6 and shall be certified by an Approved Inspection Organisation in accordance with the requirements of Chapter A7—5.

2.5.3 Any tests necessary to ensure correct functioning after modification shall be carried out.

- 3 CERTIFICATE OF COMPLIANCE** The Certificate of Compliance shall contain particulars of the work done, the place at which the work was carried out and shall identify the aircraft to which it relates. The certification shall be worded in the following manner :

I hereby certify that the inspection/overhaul/repair/replacement/modification specified above has been carried out in accordance with the requirements of Chapter A4—3 of British Civil Airworthiness Requirements.

(Signed)

(Firm)

A.R.B. Approval Ref.

or Licence No.

Date

- 4 PERSONS COMPETENT TO ISSUE CERTIFICATES OF COMPLIANCE** A Certificate of Compliance shall be issued only by the following :—

4.1 Appropriately licensed aircraft maintenance engineers or aircraft radio maintenance engineers.

4.2 Firms approved by the Board in accordance with the requirements of Chapter A7—5 as being competent to issue such certificates.

4.3 A person or firm authorised by the Minister of Aviation or the Board to issue a certificate in a particular case.

- 5 RETENTION OF DOCUMENTS** Certificates of Compliance relating to public transport or aerial work aircraft shall be preserved by the operator in the log book or any document associated therewith until a date 2 years after the aircraft, engine or variable-pitch propeller to which the certificate relates has been destroyed or has been permanently withdrawn from use. In the case of any other aircraft the certificate shall be preserved by the operator of the aircraft for a period of 2 years.

CHAPTER A5—I

WEIGHT AND BALANCE DATA

I WEIGHING OF AIRCRAFT

1.1 Aircraft shall be weighed at such times as the Board may require, under arrangements made by the operator.

1.2 The condition of the aircraft at the time of weighing shall be one which can easily be repeated and easily defined particularly with regard to the contents of tanks which contain fluid. The items of equipment fitted at the time of weighing should not differ significantly from those included in the declared "Basic Equipment" list associated with the Weight and Centre of Gravity Schedule (see paragraph 2).

1.3 The Basic Weight and the corresponding centre-of-gravity position shall be determined and entered on the Weight and Centre of Gravity Schedule.

1.4 When the Basic Weight is such that the difference between the Basic Weight and the Operating Weight is large, the Board may additionally require that the actual weight of the items of Variable Load be ascertained.

- 1.5 Records of the weighing and the calculations involved shall be made available to the Board and shall be retained by the operator until six months after the aircraft is again weighed.

2 WEIGHT AND CENTRE OF GRAVITY SCHEDULE

- 2.1 A Weight and Centre of Gravity Schedule shall be provided for each aircraft. Each schedule shall be identified by the aircraft designation and the nationality and registration marks or, if these are not known, by the constructor's serial number. The date of issue of the schedule shall be given and the schedule shall be signed by a representative of an approved organisation or an appropriately licensed aircraft engineer. A statement shall be included, indicating that the schedule supersedes all earlier issues.
- 2.2 The date or reference number of the weighing report upon which the schedule is based shall be given.
- 2.3 A copy of each schedule shall be retained by the operator and shall be preserved until six months after the schedule has been superseded. A copy of each schedule and any revised issue of the schedule shall be sent to the Board. When the maximum total weight authorised is not greater than 6,000 lb. an additional copy of the current schedule shall be displayed in the aircraft.
- 2.4 When the maximum total weight authorised is not greater than 6,000 lb., or when the maximum total weight authorised is greater than 6,000 lb. and the aircraft is certificated in the Private or Aerial Work Categories, the schedule must include Parts A, B, C and D. In all other cases it is necessary to complete Part A of the schedule only.
- 2.5 Whenever an alteration is made to the aircraft which affects the content of the schedule a revised schedule shall be issued. However, when the change is small, the re-issue may, with the agreement of the Board, be delayed provided that proper records of all such changes are maintained and all outstanding corrections are made when the schedule is re-issued.
- 2.6 Definitions of terms used in the loading of aircraft and in particular in the Weight and Centre of Gravity Schedule are as follows:—
 - 2.6.1 **Basic Weight.** This weight includes the weight of all basic equipment and the weight of the declared quantity of unusable fuel and unusable oil. In the case of turbine engines only, it can also include the weight of usable oil. From the Basic Weight it is only necessary to add the weights of the Variable and Disposable Load items to be carried in the particular role in which the aircraft is to be used, to arrive at the total loaded weight.
 - 2.6.2 **Basic Equipment.** This includes unconsumable fluids, such as engine coolant, hydraulic fluid, and all radio equipment and non-expendable equipment which is common to all roles for which the operator intends the aircraft to be used.
 - 2.6.3 **Operating (or Aircraft Prepared for Service) Weight.** The sum of the Basic Weight and the total Variable Load required for the particular role in which the operator intends the aircraft to be used.
 - 2.6.4 **Variable Load.** The weight of the crew to be carried and of items such as the crew's baggage, radio and other equipment the carriage of which depends upon the role in which the operator intends the aircraft to be used for the particular flight.

- 2.7 The Weight and Centre of Gravity Schedule consists of four parts, i.e. Parts A, B, C and D. Parts B, C and D are not in all cases required to be completed (see paragraph 2.4). The schedule should be in the form given in the Appendix to this Chapter, but variations as permitted by these Requirements may be made. In the case of helicopters, it may be necessary to present lever arms and moments about more than one axis depending upon the centre-of-gravity limits specified in the Flight Manual.
- 2.8 The datum which is defined in Part A may be different from the certification datum defined in the Certificate of Airworthiness or Flight Manual to which the centre-of-gravity limits relate. When a different datum is used, it shall be adequately defined, its precise relationship to the certification datum shall be given and any lever arms and moments which appear in any part of the schedule shall be consistent with the datum so declared.
- 2.9 **Part A Basic Weight.** The items included in the list of Basic Equipment shall be those about which there may be doubt as to whether they are included in the Basic Weight. It is not necessary to include items without which it would not under any circumstances be permissible to fly the aircraft. When the list of Basic Equipment is large and therefore inconvenient to include in Part A, suitable reference to the appropriate document may, with the agreement of the Board, be given instead, provided that :—
- (a) at least two copies of the current standard Basic Equipment List to which reference is made, are sent to the Board ; and
 - (b) any detailed variations are properly recorded in Part A.
- 2.10 **Part B Variable Load.** This may be divided into as many roles as the operator wishes. When this is done, the total of the weight and moment change appropriate to each role should be given. The weights assumed for crew members may be those given in the Air Navigation (General) Regulations.
- 2.11 **Part C Operating (Aircraft Prepared for Service) Weight.** The operating weight and associated centre-of-gravity position shall be given for each role.
- 2.12 **Part D Loading Information.** This shall include all relevant information to enable the disposable load to be safely distributed. The lever arms of the passengers in the seats appropriate to the various roles shall be given. Also the change in moment due to any aircraft configuration change such as retraction of landing gear shall, if significant, be given.
- NOTE : To ensure that the weight and centre-of-gravity limitations authorised in respect of the aircraft are not exceeded, it is important that the operator makes due allowance for the actual densities of fuel and oil, as opposed to the densities assumed in strength calculations in the design of the aircraft.
- 2.13 **Units.** The weights, distances, moments and quantities may be given in any units provided that these are used consistently and do not conflict with the markings and placards on the aircraft.

3 WEIGHT AND BALANCE REPORT

- 3.1 When the maximum total loaded weight exceeds 6,000 lb., a Weight and Balance Report shall be prepared by the applicant. This shall be provided for each aircraft as a condition of issue of a Certificate of Airworthiness for a Prototype, Prototype (Modified) or Series aircraft.

- 3.2 The Weight and Balance Report is intended to record the essential loading data applicable to the particular aircraft to an extent sufficient for a pilot to load the aircraft correctly and to enable an operator to produce written loading instructions in accordance with the requirements of the Air Navigation Order.
- 3.3 The Weight and Balance Report shall apply to the aircraft in the state in which it is to be delivered to the user but need not be amended or re-issued after delivery of the aircraft.
- 3.4 One copy of the Weight and Balance Report shall be sent to the Board if required.
- 3.5 The Weight and Balance Report shall include the following items :—
- (i) Designation and the nationality and registration marks of the aircraft ;
 - (ii) A copy of the weighing report ;
 - (iii) A copy of the Weight and Centre of Gravity Schedule including the Basic Equipment List if this is separated from Part A of the Schedule ;
 - (iv) A diagram and a description of the datums which are used for weighing and loading and an explanation of the relationship of these datums to the fuselage frame numbering system and, in the case of aeroplanes, to the standard mean chord (S.M.C.) ;
 - (v) When Part B of the Schedule has not been completed, information to enable the Operating (A.P.S.) Weight to be calculated from the Basic Weight for the different cabin layouts to be considered ;
 - (vi) When Part D of the Schedule has not been completed, information on the lever arms appropriate to items of disposable load. This will include the lever arms of fuel in the various tanks which, if necessary, should be illustrated by means of graphs, lever arms of passengers in seats appropriate to the various layouts, mean lever arms of the various baggage holds or compartments ;
 - (vii) The effect on the aircraft centre of gravity of any change in configuration, such as retraction of the landing gear, when this may be significant.
- 3.6 When it appears probable that the aircraft will be used for purposes requiring additional advice, such advice should be given, including specimen loading calculations and specimen load sheets.

4 PLACARDS

- 4.1 In small aircraft when seats are provided which may not always be usable because of weight or centre of gravity considerations, a placard shall be provided to indicate that such seats must not be used unless the centre of gravity position is recalculated.
- 4.2 The placard shall be displayed in a conspicuous place and the markings shall be such that they are not easily erased, disfigured or obscured.

APPENDIX TO CHAPTER A5—I

WEIGHT AND CENTRE OF GRAVITY SCHEDULE

.....Ltd.

Aircraft Designation

Nationality and Registration Marks.....

Maximum Permissible Total Weightlb.

PART A Basic Weight

The basic weight of the aircraft, as calculated from weighing report No./Date.....
is :—lb.

The centre of gravity of the aircraft is the same condition at this weight and with the landing gear extended is :—inches forward/aft of the datum.

This datum is the one to which the limits in the Certificate of Airworthiness or Flight Manual relate and is defined as :—

The basic weight includes the weight of the total quantity of unusable fuel and unusable oil and the weight of the following which comprise the list of "Basic Equipment" :—

<i>Item</i>	<i>Weight lb.</i>	<i>Lever Arm inches</i>
.....
.....
.....

PART B Variable Load

The weight and lever arms (measured forward or aft of the C.G. datum defined in Part A) of the variable load which includes the weight of crew and those items of equipment including usable fluids other than fuel which do not form part of the Basic Equipment are shown below. The variable load depends upon the role in which the aircraft is intended to be used.

<i>Item</i>	<i>Weight lb.</i>	<i>Lever Arm inches</i>	<i>Moment Change lb. inches</i>
Crew.....members at 165 lb. per person
.....
.....
Total	Total

PART C Operating (A.P.S.) Weight

The operating (or aircraft prepared for service) weight (assuming all the variable load items are carried) is.....lb.

The centre of gravity of the aircraft in the operating weight condition and with landing gear extended is.....inches forward/aft of the datum defined in Part A.

The total moment of the aircraft about the datum defined in Part A in the operating weight condition and with the landing gear extended is.....lb. inches.

NOTE : The operating weight is defined as the sum of the basic weight and the weight of variable load carried.

PART D Loading Information (Disposable Load)

Information is given below to enable the disposable load (fuel and payload) to be distributed so that the maximum weight and centre of gravity limits given in the Flight Manual/ Certificate of Airworthiness are not exceeded.

CHAPTER A5—1 APPENDIX

WEIGHT AND BALANCE DATA

The effect of retracting the landing gear is to cause a moment change of.....lb. inches.

Item	Lever Arm—Inches
Fuel in tanks
Maximum total usable capacity of fuel tanks.....Imp. Gallons	
Weight of this quantity of fuel at.....lb. per Imp. Gallon.....lb.	
Oil in tanks
Maximum total usable capacity of oil tanks.....Imp. Gallons	
Weight of this quantity of oil at.....lb. per Imp. Gallon.....lb.	
Passengers in Seats :	
Row 1
Row 2
Row 3
Baggage Holds :	
No. 1
No. 2

This Schedule was prepared on.....
and supersedes all previous issues.

Signed Inspector.
on behalf of

CHAPTER A5—2

FLIGHT TESTING OF AIRCRAFT

NOTE : The procedures outlined in this Chapter apply to the flight testing of aircraft as follows :—

- (i) Prototype aircraft under investigation for the issue of a certificate of airworthiness (see paragraph 1).
- (ii) Prototype (modified) aircraft under investigation for the issue of a certificate of airworthiness (see paragraph 2).
- (iii) Series aircraft under investigation for the issue of a certificate of airworthiness (see paragraph 3).
- (iv) Aircraft under investigation for the validation of a certificate of airworthiness (see paragraph 4).
- (v) Aircraft under investigation for the renewal or re-validation of a certificate of airworthiness (see paragraph 5).
- (vi) Aircraft under investigation for the airworthiness acceptance of modifications made after issue or validation of the certificate of airworthiness (see paragraph 6).

I PROTOTYPE AIRCRAFT

NOTE : The Board cannot accept responsibility for damage to aircraft or third parties while aircraft are in the charge of the Board's staff.

1.1 Preparation

1.1.1 At an early stage of design, certain features of the aircraft (e.g. pilot's view ; accessibility of cockpit controls), which will be finally assessed during flight trials, should be demonstrated to the Board. A "mock-up", or such other layout of the aircraft, should be used for demonstration purposes.

1.1.2 The special provisions which may be required for purposes of the flight trials shall be discussed with the Board (e.g. safety harnesses ; parachute stowages ; emergency exits ; anti-spin parachutes ; means for over-riding or disconnecting automatic devices ; instrumentation). Such provisions must be discussed sufficiently in advance of flight trials to enable the appropriate action to be taken in the design and construction of the aircraft.

1.1.3 Prior to the commencement of preliminary flight trials, the applicant shall furnish the following information to the Board (any subsequent alterations shall be notified to the Board) :—

- (i) A summary of the aerodynamic assumptions which have been used in design calculations and which require to be checked against flight test results (e.g. stalling speeds ; pitching and hinge moment coefficients).
- (ii) Such aircraft performance estimates as the Board may decide.
- (iii) A statement indicating the airworthiness conditions and the types of operation with which it is proposed to establish compliance. This statement may include but will not necessarily be confined to information concerning :—
 Strength Category(ies).
 Performance Group(s).
 Weight/C.G. Envelope.
 Flight in Non-temperate Conditions.
 Flight in Icing Conditions.
 Instrument Flight.
 Flight by Night.
 Use of Oxygen.
 Use of Cabin Pressurisation.
 Speed Limitations (e.g. V_D , V_{NE} , V_{NO} , flaps and landing gear speed limitations).

1.1.4 The applicant shall lodge with the Board, for approval, a flight test schedule containing details of the proposed flight tests. This schedule shall include the flight tests necessary :—

- (i) to establish compliance with the appropriate airworthiness requirements, and
- (ii) to provide information for inclusion in the documents associated with the certificate of airworthiness.

NOTE : The Board may require alterations to the flight test schedule following preliminary flying of the aeroplane and may also call for additional tests not included in the schedule if it appears that such tests are necessary to establish the airworthiness of the aeroplane type.

1.1.5 Prior to the commencement of the Airworthiness Acceptance Trials (see paragraph 1.2), the applicant shall provide adequate opportunity for the Board's representatives to become familiar with the aircraft, and the following information shall be furnished to the Board :—

- (i) Details of the special instruments fitted to the aircraft for the purpose of the Airworthiness Acceptance Trials.
- (ii) Details of the aerodromes, atmospheres, and aircraft weights at which it is proposed to conduct the Airworthiness Acceptance Trials and such other details, relating to the test condition, as the Board may require.
- (iii) Details, given by reference or in full as appropriate, of the proposed methods of correction of flight test results.

1.1.6 The information referred to in paragraph 1.1.5 and such matters as flight test technique, methods of instrument calibration, methods of presentation of flight test results, preparation of handling and performance information shall be agreed in consultation with the Board.

1.2 Airworthiness Acceptance Trials

1.2.1 The applicant shall give reasonable notice to the Board of the date on which it is proposed to commence the Airworthiness Acceptance Trials. The Board's representatives shall be given the opportunity to participate in the whole of these trials.

1.2.2 The applicant's test pilots, flight and maintenance crews, and observers, who have been associated with the aircraft during the preliminary flight trials, should, wherever possible, continue to be engaged in the same capacity until the Airworthiness Acceptance Trials are completed.

- 1.2.3 The aircraft should be in a fully representative design condition when the Airworthiness Acceptance Trials are carried out. A statement identifying the design condition at the commencement of these trials shall be furnished to the Board and if there are any significant variations in the design from that originally intended this shall be stated. The statement shall include sufficient detail to identify the design and modification state of the aircraft and shall include all limitations, including temporary limitations, applicable to the flight trials. It shall be amended as necessary to reflect the development state of the aircraft and both the original and each amendment shall be dated and signed by a senior member of the Approved Design Organisation.
- 1.2.4 The aircraft shall be tested in accordance with the approved flight test schedule and the techniques involved in carrying out each of the flight tests shall be to the satisfaction of the Board.
- 1.2.5 Any design changes made to the aircraft during the Airworthiness Acceptance Trials (e.g. incorporation of modifications; adjustments to power plant, control surfaces, general rigging) shall be notified to the Board. If any design change renders a previous flight test invalid, the particular flight test concerned shall be repeated.
- 1.2.6 As the Airworthiness Acceptance Trials proceed, the applicant shall furnish to the Board the flight test reports which, when completed, will provide full particulars and results of all tests specified in the approved flight test schedule. The flight test reports shall bear a reference number, and shall include the following particulars in respect of each test :—
- (i) The purpose of the particular test, indicating the relevant requirement(s) with which compliance is to be established.
 - (ii) The relevant test conditions (e.g. the condition, loading and configuration of the aircraft and the weather information).
 - (iii) A description of the way in which the test was carried out.
 - (iv) The relevant behaviour of the aircraft when subjected to the test.
 - (v) The readings taken during the test, together with the corrected results.
 - (vi) The conclusions drawn from the test.
- 1.2.7 The speeds obtained during the handling trials, which are to be used in the performance trials, shall be summarised in a report and agreed by the Board.
- 1.2.8 The aircraft shall be held at the disposal of the Board so that such flight tests as may be considered necessary can be repeated.
- 1.3 **Total Flying Before Certification.** The Board will, according to the design features of the aircraft and to its behaviour throughout the flight test period, decide the minimum number of hours required to be completed before a recommendation can be made for certification. This total must normally include a period representative of typical operational use. The object of this flying is to demonstrate the suitability for safe operation and reliability of the aircraft over representative routes as it would be used by a typical operator. It is, therefore, desirable for these trials to be carried out by an operator's flying and maintenance crews. The Board shall be consulted prior to the commencement of the trials so that a suitable programme may be agreed. Usually the Board will require all, or at least a certain amount, of this flying to be performed by a single aircraft.

2 PROTOTYPE (MODIFIED) AIRCRAFT

NOTE : The Board cannot accept responsibility for damage to aircraft or to third parties while aircraft are in the charge of the Board's staff.

- 2.1 If, in the opinion of the Board, the design of an aircraft is so modified as to affect the flight characteristics or the functioning in flight of the aircraft, the Board may decide that special flight tests are required. If so decided, the procedure outlined in

paragraph 1 shall be followed except where any part of that procedure is clearly inapplicable. The flight test schedule referred to in paragraph 1.1.4 shall include :—

- (i) The flight tests necessary to establish compliance with the appropriate airworthiness requirements. In particular cases, these may include but may not be confined to the flight tests to establish that the modification has not adversely affected compliance with the appropriate airworthiness requirements.
- (ii) The flight tests necessary to provide information for inclusion in the documents associated with the certificate of airworthiness.
- (iii) The flight tests as contained in the approved flight test schedule for a series aircraft of the aircraft type concerned, except where covered by the tests referred to in paragraphs (i) and (ii).

2.2 If no special flight tests are required, the aircraft shall be flight tested as a series aircraft and the procedures outlined in paragraph 3 shall be followed.

3 SERIES AIRCRAFT

NOTE : The Board cannot accept responsibility for damage to aircraft or to third parties while aircraft are in the charge of the Board's staff.

3.1 Flight tests shall be completed by the applicant to ensure that the flight characteristics of the aircraft and the functioning in flight of the aircraft parts, do not differ significantly in an adverse sense from those of its prototype. The applicant will be notified if the Board requires its representatives to participate in flight tests and for this purpose the applicant will be required to provide adequate opportunity for the Board's representatives to become familiar with the aircraft.

3.2 Details of the flight tests proposed to be completed shall be contained in a flight test schedule prepared by the applicant and approved by the Board.

3.3 The flight test schedule referred to in paragraph 3.2 shall bear details identifying the aircraft type to which it refers and shall be marked with a reference number, issue number and date of issue and shall include the following tests :—

- (i) Tests to check the performance of the aircraft.
- (ii) Tests to check the handling qualities of the aircraft. The details of the tests to be made will be decided in consultation with the Board and will be decided on the characteristics revealed during the flying of the prototype.

NOTE : For many aeroplane types it is convenient for the schedule to contain the following tests, since these combine, in a brief form, checks on a number of flight characteristics. (a) a qualitative assessment of the take-off, (b) an assessment of the trim, primary flight controls and trimmers in a typical cruise, (c) flight at maximum speed, (d) stalls in the take-off and landing configuration, (e) a simulated engine failure (applicable to aeroplanes with more than one engine), (f) a qualitative assessment of the landing.

- (iii) Tests to check functioning in flight of the aircraft parts.
- (iv) Such other tests as the Board may require.

3.4 The applicant's test pilots, flight crew and observers engaged in the flight trials should, wherever possible, consist of persons who have previously been associated with airworthiness acceptance of an aircraft of the type.

3.5 The applicant shall furnish a flight test report prepared in a form acceptable to the Board. If, on receipt of the flight test report, the Board concludes that certain tests need to be repeated by the applicant or by the Board, the applicant will be so notified.

4 VALIDATION

NOTE : The Board cannot accept responsibility for damage to aircraft or to third parties while aircraft are in the charge of the Board's staff.

4.1 When an aircraft is submitted for validation in the United Kingdom, flight tests will normally have been completed by the country of origin to establish compliance with :—

- (i) The airworthiness requirements of the country of origin.
- (ii) Such special conditions (see Chapter A2—4) as may have been imposed by the United Kingdom as a condition of validation.

4.2 An aircraft of the type submitted for validation shall be placed at the disposal of the Board in order that its pilots may :—

- (i) Become familiar with the aircraft type.
- (ii) Repeat any flight tests as are considered necessary.
- (iii) Obtain information on the basis of which test schedules for re-validation of the certificate of airworthiness can be prepared (see paragraph 5).

4.3 In certain circumstances the Board may require special flight tests in the United Kingdom. If this procedure is necessary the applicant will be notified and shall arrange for the tests to be conducted by a person or organisation acceptable to the Board.

4.3.1 The flight test schedule for the special tests shall be prepared in conjunction with the Board and shall be acceptable to the Board.

4.3.2 The aircraft shall be tested in accordance with the agreed flight test schedule. The Board's representatives shall be given the opportunity of participating in the tests and of repeating any of the tests if this is considered necessary.

4.3.3 The applicant shall furnish a flight test report in a form acceptable to the Board.

5 RENEWAL/RE-VALIDATION

NOTE : The Board cannot accept responsibility for damage to aircraft or to third parties while aircraft are in the charge of the Board's staff.

5.1 Flight tests shall be completed by the applicant to ensure that the aircraft flight characteristics, and the functioning in flight of the aircraft, do not differ significantly in an adverse sense from those acceptable to the Board in respect of the aircraft. These tests are required annually or at such other intervals as may be agreed by the Board with the operator of the aircraft. The applicant will be notified if the Board requires its representatives to participate in flight tests and for this purpose the applicant will be required to provide adequate opportunity for the Board's representatives to become familiar with the aircraft.

5.2 The Board will prepare and publish a Renewal Flight Test Schedule for the aircraft type concerned and the aircraft shall be tested either to this schedule or to a test schedule (prepared by the applicant and approved by the Board) containing as a minimum the tests laid down in the Renewal Flight Test Schedule.

5.3 The Renewal Flight Test Schedule referred to in paragraph 5.2 will include the following tests :—

- (i) Tests to check the performance of the aircraft.

- (ii) Tests to check the handling qualities of the aircraft. The details of the tests to be made will be decided in consultation with the Board and will be decided on the characteristics revealed during flying of the prototype, the results of the series tests and the subsequent history of the aircraft.

NOTE : For many aeroplane types it is convenient for the schedule to contain the following tests, since these combine, in a brief form, checks on a number of flight characteristics. (a) a qualitative assessment of the take-off, (b) an assessment of the trim, primary flight controls and trimmers in a typical cruise, (c) flight at maximum speed, (d) stalls in the take-off and landing configuration, (e) a simulated engine failure (applicable to aeroplanes with more than one engine), (f) a qualitative assessment of the landing.

- (iii) Tests to check functioning in flight of the aircraft parts.
- (iv) Such other tests as the Board may require.

5.4 The applicant's test pilots, flight crew and observers should consist of persons who are familiar with the type of aircraft concerned.

5.5 The applicant shall furnish a flight test report prepared in a form acceptable to the Board. If on receipt of the flight test report the Board concludes that certain tests need to be repeated by the applicant or by the Board, the applicant will be so notified.

6 MODIFICATIONS NOT PREVIOUSLY INVESTIGATED AND APPROVED

NOTE : The Board cannot accept responsibility for damage to aircraft or to third parties while aircraft are in the charge of the Board's staff.

6.1 If in the opinion of the Board a modification is such that it is likely to affect the flight characteristics or performance or the functioning in flight of the aircraft, or if the aircraft needs to be checked to ensure that the modification is compatible with and suitable to the aircraft type, the Board may decide that special flying tests are required. If so decided, the procedure outlined in paragraph 1 shall be followed except where any part of that procedure is clearly inapplicable. The flight test schedule referred to in paragraph 1.1.4 shall include :—

6.1.1 The flight tests necessary to establish compliance with the appropriate airworthiness requirements. In particular cases, this may include but may not be confined to the flight tests to establish that the modification has not adversely affected compliance with the appropriate airworthiness requirements.

6.1.2 The flight tests necessary to provide information for inclusion in the documents associated with the certificate of airworthiness.

CHAPTER A5—3

DUPLICATE INSPECTION OF CONTROL SYSTEMS

NOTE : (i) The procedures outlined in this Chapter apply to all components and parts of systems, the failure of which could prejudice the safety of the aircraft.

- (ii) This Chapter should be read in conjunction with Civil Aircraft Inspection Procedures Leaflets AL/3—4, dealing with the duplicate inspection of flying controls, and PPL/3—1, dealing with the duplicate inspection of engine controls.

I DEFINITIONS

1.1 **Flying Control Systems.** The requirements for duplicate inspection apply to the control surfaces, including the primary flight controls, tabs, flaps and air brakes, and the mechanisms used by the pilot to operate them. In the case of rotorcraft they apply to the mechanisms used by the pilot to operate collective pitch and throttle, cyclic pitch and yawing controls.

1.2 Engine Control Systems. The requirements for duplicate inspection apply to the primary engine controls, system controls and ancillary controls (e.g. throttle controls, fuel cock controls, propeller controls, etc.), and the mechanisms used by the pilot and/or the flight engineer to operate them.

1.3 Associated Control Systems. The requirements for duplicate inspection also apply to such systems (other than those named in paragraphs 1.1 and 1.2) as are interlinked in such a manner with the main flying and/or engine control systems that they could adversely affect the correct operation of the main system to an extent which could prejudice the safety of the aircraft.

1.4 Duplicate Inspection. A duplicate inspection is an inspection which is first made and certified by one person and is then repeated by another person and again certified.

NOTE: Components or systems subject to duplicate inspection must not be disturbed or readjusted between the first and second parts of the inspection and the second part of the inspection must, as nearly as possible, follow immediately after the first part. In some circumstances, due to peculiarities of assembly or accessibility, it may be necessary for both parts of the inspection to be made simultaneously.

2 CONTROL SYSTEM COMPONENTS

2.1 Control system components, the parts of which are concealed during bench assembly prior to installation, shall be inspected in duplicate on assembly during manufacture, overhaul or repair.

2.2 Internal locking and critical assembly features, the correctness of which cannot be proved during final inspection or functioning tests with the assembly installed in the aircraft, shall be inspected in duplicate during assembly. Both parts of the duplicate inspection and the results of the tests made during and after final assembly shall be certified on the Inspection Record of the part concerned.

3 FLYING CONTROL SYSTEMS

3.1 A duplicate inspection of the flying controls shall be made (a) before the first flight of all aircraft after initial assembly, (b) before the first flight after the overhaul, replacement, repair, adjustment or modification of the system. Persons considered competent to make the first and second parts of the duplicate inspection are :—

Aircraft engineers appropriately licensed in Categories A and/or B.

Members of an appropriately approved inspection organisation who are considered by the Chief Inspector competent to make such inspections.

3.2 The two parts of the duplicate inspection shall be the final operations after all work on, or associated with, the system has been completed. Each separate control must be carefully examined from end to end to establish integrity of the complete system.

3.3 In certain aircraft and systems, it may not be possible after complete erection to inspect all parts of the systems, since sections of them may have been progressively sealed off. In such cases the condition and security of attachment of the obscured portion of the system shall be established to the satisfaction of the persons named in paragraph 3.1 and such tests shall be completed as will determine that the part of the system has full, free and correct directional movement.

3.4 If, after the duplicate inspection has been completed, the flying control system is disturbed in any way before the first flight, that part of the system which has been disturbed shall be inspected in duplicate before the aircraft flies by persons considered competent to make such inspections as in paragraph 3.1.

3.5 If the flying control system is disturbed in any way and at any time after the first flight (as defined in paragraph 3.1) that part of the system which has been disturbed shall be inspected in duplicate before the aircraft again flies by persons considered competent to make such inspections as in paragraph 3.1. However, should a minor adjustment of the flying control system be necessary when the aircraft is away from base, the second part of the duplicate inspection may be performed by a pilot or flight engineer licensed for the type of aircraft concerned.

3.6 **Functioning of Controls.** The inspections prescribed in the preceding paragraphs shall include verification that full, free and correct movement of the control surfaces relative to the movements of their control columns, wheels and pedals is obtained.

4 ENGINE CONTROL SYSTEMS

4.1 A duplicate inspection of the engine controls shall be made (a) before the first flight of all aircraft after initial assembly and (b) before the first flight after the overhaul, replacement, repair, adjustment or modification of the engine control systems. Persons considered competent to make the first and second parts of the duplicate inspection are :—

Aircraft engineers appropriately licensed in Categories C and/or B.

Members of an appropriately approved inspection organisation who are considered by the Chief Inspector competent to make such inspections.

4.2 The two parts of the duplicate inspection shall be the final operations after all work on, or associated with, the system has been completed. Each separate control must be carefully examined from end to end to establish integrity of the complete system.

4.3 In certain aircraft and systems, it may not be possible after complete erection to inspect all parts of the systems, since sections of them may have been progressively sealed off. In such cases the condition and security of attachment of the obscured portion of the system shall be established to the satisfaction of the persons named in paragraph 4.1 and such tests shall be completed as will determine that the part of the system has full, free and correct directional movement.

4.4 If, after the duplicate inspection has been completed, the engine control system is disturbed in any way before the first flight, that part of the system which has been disturbed shall be inspected in duplicate before the aircraft flies by persons considered competent to make such inspections as in paragraph 4.1.

4.5 If the engine control system is disturbed in any way and at any time after the first flight (as defined in paragraph 4.1) that part of the system which has been disturbed shall be inspected in duplicate before the aircraft again flies by persons considered competent to make such inspections as in paragraph 4.1. However, should a minor adjustment of the engine control system be necessary when the aircraft is away from base, the second part of the duplicate inspection may be performed by a pilot or flight engineer licensed for the type of aircraft concerned.

4.6 **Functioning of Controls.** The inspections prescribed in the preceding paragraphs shall include verification that full, free and correct movement of controls at the engine end is obtained relative to the movement of the crew controls.

5 ASSOCIATED CONTROL SYSTEMS

5.1 A duplicate inspection of associated control systems shall be made (a) before the first flight of all aircraft after initial assembly, (b) before the first flight after the overhaul, replacement, repair, adjustment or modification of the system. Persons considered competent to make the first and second parts of the duplicate inspection are :—

Appropriately licensed aircraft engineers.

Members of an appropriately approved inspection organisation who are considered by the Chief Inspector competent to make such inspections.

5.2 The two parts of the duplicate inspection shall be the final operations after all work on, or associated with, the system has been completed. Each separate associated control system must be carefully examined from end to end to establish the integrity of the system.

5.3 In certain aircraft and systems, it may not be possible after complete erection to inspect all parts of the systems, since sections of them may have been progressively sealed off. In such cases the condition and security of attachment of the obscured portion of the system shall be established to the satisfaction of the persons named in paragraph 5.1 and such tests shall be completed as will determine the integrity of that part of the system.

5.4 If, after the duplicate inspection has been completed, the associated control systems are disturbed in any way before the first flight, those parts of the systems which have been disturbed shall be inspected in duplicate before the aircraft flies by persons considered competent to make such inspections as in paragraph 5.1.

5.5 If the associated control systems are disturbed in any way and at any time after the first flight (as defined in paragraph 5.1) those parts of the system which have been disturbed shall be inspected in duplicate before the aircraft again flies by persons considered competent to make such inspections as in paragraph 5.1. However, should a minor adjustment of an associated control system be necessary when the aircraft is away from base, the second part of the duplicate inspection may be performed by a pilot or flight engineer licensed for the type of aircraft concerned.

5.6 **Functioning of Associated Control Systems.** The inspections prescribed in the preceding paragraphs shall include verification that full, free and correct movement of the relevant flying control or engine control is obtained relative to the movement of the crew controls.

CHAPTER A5—4**FUEL AND OIL**

1 GENERAL The operator of an aircraft is responsible for ensuring that the fuel and oil used in the engine of the aircraft conform to the particular Specifications of fuel and oil approved by the Board for use in that engine. Particulars of the approved Specifications of fuel and oil which shall be used in an engine will be given in the Flight Manual and in the engine manuals.

2 FUEL Because the Board cannot adequately supervise fuel supply procedures, its approval in this respect is confined to the approval of the written procedures prescribed by fuel supply companies which, if adhered to, will ensure that an operator is supplied

with fuel to Specification. Companies supplying fuel, whose written procedures have been approved by the Board, are authorised to issue with each supply of fuel a statement to this effect. The documents on which such a statement is made must not, however, be related in any way to the form of Approved Certificate used by companies approved by the Board under the Air Navigation Order.

- 3 OIL** Companies approved by the Board under the Air Navigation Order for the supply of oil are authorised to issue with each sealed container of oil an Approved Certificate to the effect that the oil referred to in the Certificate conforms to a particular Specification.

CHAPTER A6—I

FLIGHT MANUALS

NOTE : (i) The Board will, subject to the approval of the Ministry of Aviation, prepare Flight Manuals and amendments thereto for all aircraft which are constructed in the United Kingdom except for :—

- (a) those of which the prototype was certificated prior to 5th April, 1949, and
- (b) those of which the prototype is certificated after 30th March, 1962, and which have a maximum permissible weight which is not greater than 6,000 lb.

(ii) A Flight Manual is a document containing limitations, information and procedures necessary for the safe operation of the aircraft. The Flight Manual, by definition in the Air Navigation Order, forms part of the Certificate of Airworthiness.

I AIRCRAFT CONSTRUCTED IN THE UNITED KINGDOM FOR WHICH THE FLIGHT MANUAL WILL BE PREPARED BY THE BOARD

1.1 Provision of Information

1.1.1 Flight Manuals will be based on information supplied to the Board by the applicant. Details of the required contents of Flight Manuals will be found in the appropriate Sections of the Requirements.

1.1.2 Information shall be supplied in draft form, two copies of all written material being required. When graphs are required these shall be provided on paper of a type which can be supplied by the Board on request, and the drawings shall be originals of good quality suitable for photographing.

NOTE : Captions should be effected either by means of stencils or by type-script in which case the use of an electric typewriter or a machine fitted with a carbon ribbon may be advisable.

1.1.3 When drawings or diagrams are supplied which are not of contact size, they shall be black line drawings on a neutral background and the overall dimensions shall not exceed 2 ft. x 2 ft.

NOTE : Specimen Flight Manuals and Specimen Performance Charts illustrating an acceptable layout are available on repayment. Details will be supplied on request.

1.2 Prototype and Prototype (Modified) Aircraft

1.2.1 For a prototype aircraft, a new document will be published. However, this will not always be necessary in the case of prototype (modified) aircraft ; when it is convenient to do so, the basic document relating to an earlier variant will be utilised and those features which, on the new variant, differ from previous variants will be reflected in the Flight Manual by suitable amendments.

1.2.2 The applicant shall supply for inclusion in the Flight Manual such data as may be required (see paragraph 1.1).

1.2.3 When it is intended that the aircraft is to be exported to a State which, as a condition of validation of the United Kingdom Certificate of Airworthiness, requires that the Flight Manual meets detailed requirements which differ from the applicable British requirements, the Board shall be informed accordingly at least eight weeks prior to the intended date of certification. Such a Flight Manual will not in any case be issued until the aircraft is registered in the State to which it is intended to be exported.

1.3 Series Aircraft

1.3.1 At least 14 days prior to the date on which certification is requested the applicant shall forward to the Board a summary of the modifications to be embodied in the aircraft. This shall include a comparison with some similar aircraft which has previously been certificated and whose Flight Manual is the same basic document.

1.3.2 Upon the basis of this comparison the Board will then be able to produce a copy of the Flight Manual to the appropriate amendment standard.

1.4 Amendments

1.4.1 With the exception of the Weight and Centre of Gravity Schedule (see Chapter A5—1), all amendments are prepared by the Board and approved by the Ministry of Aviation. The applicant shall provide such information as may be required (see paragraph 1.1).

1.4.2 When any significant change is involved, the Board may require major modification procedure (Chapter A4—1) to be followed.

1.4.3 Amendments are classified as either General or Particular, these terms being defined as follows :—

(i) A General amendment is one which, at a given time, applies in the same way to all aircraft which use a Flight Manual having the same basic document reference number.

(ii) A Particular amendment is one which reflects the differences in content between one copy of the basic document and another.

When an amendment is necessary, the applicant should indicate which classification is applicable.

1.4.4 Should a revision which affects airworthiness be required to be embodied as a matter of such urgency that the normal amendment procedures are likely to take too long, the Board may, with the agreement of the Ministry of Aviation, issue a temporary change by means of an Amendment Bulletin. This process will, however, only be applied to certain documents.

1.4.5 Amendments to Flight Manuals of aircraft which are registered in the United Kingdom are embodied on behalf of the Ministry of Aviation by the Board's Surveyors or by a representative of the owner to whom the Board delegates such duties.

1.4.6 Amendments to Flight Manuals of aircraft which are not registered in the United Kingdom are embodied under arrangements made by the operator with the appropriate State Authority to whom the Board will, unless some arrangement is made to the contrary, forward all such amendments.

**2 AIRCRAFT CONSTRUCTED IN THE UNITED KINGDOM WHICH HAVE A
MAXIMUM WEIGHT NOT GREATER THAN 6,000 LB.**

NOTE : The requirements in this paragraph apply to aircraft, the prototype of which was certificated after 30th March, 1962.

2.1 Provision of Information. The constructor shall publish a Flight Manual for each aircraft. The Manual shall contain such limitations, operating procedures and information, as are prescribed by the relevant design requirements.

NOTE : Until detailed requirements which are specially applicable to light aircraft are published by the Board, the applicant may opt to comply with some interim requirements, the first issue of which became effective on 30th March, 1962. Specimen Manuals which illustrate these requirements can also be obtained from the Board on request.

2.2 Approval. Three copies of the draft material shall be supplied to the Board for approval at least one week prior to the intended date of certification of the aircraft. Following approval of the Manual, four specimen copies of the final version shall be supplied to the Board and the constructor shall provide the Board with four copies of all relevant amendments, after their approval.

2.3 Amendments. All amendments shall be approved by the Board before embodiment in any copy of the Manual. Amendments shall be effected by means of the inclusion of printed pages in place of, or in addition to, the existing pages. The amendment record sheet shall be re-issued with each amendment ; this record sheet shall show the amendment number, the numbers of the pages affected and should give a brief description of the changes made by the amendment.

2.4 Supplements. The effect on the Manual of features of aircraft customer modifications, for example, which are not normally part of the constructor's basic specifications shall be included by means of supplements. All such supplements shall be approved by the Board before embodiment in any copy of the Manual. When a supplement has been approved, the applicant shall provide the Board with four copies of it. Each supplement shall be identified by a number which will be allocated by the applicant and the date of its approval shall be shown on each page. A supplement shall be printed on paper of the same size as the particular Manual in which it is to be embodied.

2.5 Series Aircraft. A copy of the Manual relating to the aircraft and having the required registration particulars entered on the title page shall be sent to the Board at least 7 days prior to the intended date of certification of the aircraft. This copy, having been inspected, will be associated with the Certificate of Airworthiness and will be returned to the applicant.

3 AIRCRAFT CONSTRUCTED OUTSIDE THE UNITED KINGDOM

NOTE : The procedure for the validation of certificates of airworthiness is prescribed in Chapter A2—4.

3.1 Types not previously registered in the United Kingdom

3.1.1 When the provision of a Flight Manual is a condition of validation, three copies of the Flight Manual, in addition to the copy which is associated with the Certificate of Airworthiness, shall be supplied to the Board. The Flight Manual must have been approved by the appropriate Authority of the State in which the aircraft was constructed. When so requested, the Board will advise on the interpretation of whichever British requirement may be applicable.

NOTE : Specimen Flight Manuals and Specimen Performance Charts illustrating the application of some of the requirements are available on repayment. Details will be supplied on request.

3.1.2 Each Flight Manual shall contain at least sufficient information to enable compliance with the relevant operating regulations (the Air Navigation Order and the Air Navigation (General) Regulations) to be established.

3.1.3 Each Flight Manual shall be adequately identified either by a report or document reference number or by the exact type designation particulars of all the aircraft to which the Manual relates.

3.2 Series Aircraft

3.2.1 The Flight Manual of the particular aircraft shall be made available for inspection by the Board when the Certificate of Airworthiness is presented for validation. The applicant shall ensure the following :—

- (a) that the registration particulars relating to the aircraft are shown ;
- (b) that the approval status of the Manual is clearly indicated ;
- and
- (c) that the copy is identical with the approved Flight Manual which was submitted when the prototype was certificated (see paragraph 3.1) except where changed by the embodiment of approved amendments (see paragraph 3.3).

3.2.2 When the amendment system of the document is such that the contents may vary from one copy to another, two additional copies relating to each particular aircraft shall be supplied. These are required by the Board and the Ministry of Aviation for record purposes.

3.3 **Amendments.** No amendments may be embodied in any Flight Manual without the approval of the Board and the Ministry of Aviation. Amendments are of two kinds :—

- (a) those which are published by the constructor in the country of origin ; and
- (b) those which are produced in the United Kingdom.

The procedures for obtaining approval and the embodiment of such amendments are as follows :—

3.3.1 Amendments which are published by the Constructor

- (i) Evidence must be supplied that the changes proposed are approved by the appropriate Authority of the State in which the aircraft was constructed. The applicant shall ensure that copies of the proposed revision are supplied sufficient for the number of copies of the Manual held by the Board and the Ministry (see paragraph 3.1).
- (ii) The investigations by the Board and the Ministry will usually be restricted to a scrutiny to ensure that the amendment is consistent with (a) the basis upon which the aircraft was certificated ; and (b) the current operating regulations (Air Navigation Order and Air Navigation (General) Regulations).
- (iii) When the amendment is approved in writing it may then be embodied by the owner in all the relevant Manuals, and the applicant shall inform the Board on what date this was done and which aircraft were affected.

3.3.2 Amendments which are published in the United Kingdom

- (i) When it is necessary to change the particulars in an approved Manual without reference to the State in which the aircraft was constructed, this may be done either by means of a "Change Sheet" or, when suitable provision has been made, by the inclusion of an appendix. These may be produced by a suitably approved organisation.
- (ii) Two draft copies of the proposed changes shall be sent to the Board ; supplements shall meet the requirements of paragraph 2.4. Each change shall be identified by a number and the name of the responsible organisation.

- (iii) When the change sheet or supplement has been approved in writing, it may then be embodied in the Manuals of any applicable aircraft and the applicant shall inform the Board on what date this was done and which aircraft were affected. Three copies of the final version of the change sheet or supplement shall be sent to the Board.
- (iv) A page upon which the embodiment of each change sheet or supplement is recorded shall be included in each Manual.

CHAPTER A6—2

MAINTENANCE, OVERHAUL AND REPAIR MANUALS

- 1 For every aircraft granted a Certificate of Airworthiness the aircraft constructor shall provide manuals containing such information and recommendations as may be necessary for the safe operation, maintenance, overhaul and repair of the aircraft, including its engines, propellers, components, accessories, equipment, instruments, electrical apparatus, and their associated systems, and the radio station fixed fittings.
- 2 Manuals, produced in accordance with this Chapter by the constructors of the aircraft, engines and propellers, and by the manufacturers of the components, accessories, equipment, instruments and electrical apparatus, will normally be compiled and published under the authority of the Design Approval held by the constructor or manufacturer and need not, unless otherwise requested by the Board, be submitted for the approval of the Board.
 - 2.1 All manuals must bear a statement signifying that they have been compiled in accordance with this Chapter and that their content and accuracy have received the approval for publication of the Approved Design Organisation ; this statement must be certified by the Approved Design Organisation. A copy of each certified manual must be lodged with the Board.
 - 2.2 Where the manufacturer subsequently publishes documents (e.g. Service Bulletins) which may affect the content of the manuals, such documents shall bear a statement signifying that their content and accuracy have received the approval for publication of the Approved Design Organisation ; this statement must be certified by the Approved Design Organisation.
- 3 The Board reserves the right to investigate the content of any certified manual and to require the embodiment of any amendment which is considered necessary to satisfy the requirements of this Chapter, Chapter A4—1 and Chapters A7—1 to A7—4 inclusive.
- 4 In the case of manuals for engines and propellers, and for those products which are approved under the Accessory Procedure prescribed in Chapter A3—3, manufacturers shall provide the constructor of the aircraft with certified manuals, constituted as detailed in the Appendix to this Chapter, which relate to those of their products installed in the aircraft. In the case of products which are approved under the Component Procedure prescribed in Chapter A3—3, manuals, constituted as detailed in the Appendix to this Chapter, shall be provided by the manufacturer or shall be produced by the constructor of the aircraft in collaboration with the manufacturer.
- 5 At the date of issue of the first full Certificate of Airworthiness, all relevant manuals must be to a standard of completion as agreed with the Board and available for issue at that time. Thereafter the constructor or accessory or component manufacturer shall

review certified manuals at periods not exceeding six months, where any changes initiated by him which may affect safe operation, maintenance, overhaul and repair have occurred and shall publish permanent amendments which have been certified as detailed in paragraph 2.

5.1 In order that essential information can be published between the six-monthly review periods a serialised system for temporary revision shall be provided ; these revisions shall be certified and be subsequently embodied in the permanent amendment procedure.

5.2 Certified amendments and revisions for which he is responsible shall be circulated by the constructor or manufacturer to registered holders of the manuals, together with the necessary instructions for embodiment and recording in the manuals. Each manual shall contain a statement which will indicate that the inclusion of an uncertified amendment will invalidate the initial certification of the manual.

5.3 In the event of the operator of an aircraft modifying the airframe, engines or equipment, which changes have not been initiated by the constructor, the operator must :—

- (i) issue an amendment bearing a statement as to its technical accuracy and compliance with this Chapter ;
- (ii) furnish the Board with two copies of the amendment ;
- (iii) incorporate the amendment in the manual and record its incorporation in the appropriate revision index.

5.4 It will be the responsibility of the registered holder to make the necessary arrangements with constructors or manufacturers to ensure receipt of amendments and revisions to manuals together with any Service Bulletins or similar documents that may be issued from time to time.

5.5 All manuals shall be adequately illustrated and include such information as is necessary to meet the requirements of paragraph 1. Manuals containing the information given in the Appendix to this Chapter would comply with this requirement.

NOTE : Manuals produced to conform with any one of the following specifications would be accepted as a basis for complying with this Chapter, subject to the inclusion of any variation from the Specifications which might be required by the Board :—

- (a) S.B.A.C. Specification for Aircraft Technical Publications—Parts 1 to 7—issued by the Society of British Aircraft Constructors.
- (b) Specification for Manufacturers' Technical Data—Air Transport Association of America—Specification No. 100.
- (c) S.B.A.C. Standard Method of Applying A.T.A. Specification No. 100 to Accessory Manufacturers' Manuals—issued by the Society of British Aircraft Constructors.

Other methods of compliance would be acceptable provided they have first received the agreement of the Board.

APPENDIX TO CHAPTER A6—2

I AIRCRAFT MAINTENANCE MANUAL

1.1 **Introduction.** A brief survey of the aircraft features and data of general interest.

1.2 **Description.** The construction of the aircraft including its control surfaces, landing gear, flying control systems and all other systems, e.g. hydraulic, pneumatic, vacuum and de-icing ; all installations, e.g. engine, propeller, instruments, electrical, and radio station fixed fittings and all equipment installations, e.g. lifebelts, dinghies, fire detection and prevention. Where necessary, the purpose of individual parts should be described.

1.3 Operation. The method whereby the components, systems, and installations achieve their designed purpose.

1.4 Control. The method of operating the components, systems and installations together with any special procedures and limitations.

1.5 Servicing. Details regarding servicing points, capacities of tanks, reservoirs, etc., types of fluid to be used, pressures applicable to the various systems, positions of access of inspection panels, walkways and drain locations, lubrication points and the lubricants to be used, servicing equipment provided, ground handling details such as taxiing, towing, parking, mooring, jacking and levelling, and loading data including loading limitations.

1.6 Maintenance

1.6.1 Schedule. Each part of the aircraft, engines and propellers, the accessories, instruments and equipment, and the recommended periods at which, as appropriate, they should be cleaned, inspected, adjusted, tested and lubricated, and the degree of inspection recommended at the periods quoted.

1.6.2 Procedures. The methods to be used for implementing the recommended schedule, e.g. methods of access to specified parts, the methods of inspection, etc.

1.6.3 Faults and Rectification. The faults which may arise during service or those which may be found as a result of inspection, together with suggested causes and recommended methods of rectification.

1.6.4 Adjustments and Testing. The methods of completing the adjustments or tests which may be required during service or to correct faults, e.g. control movements with permissible tolerances.

1.7 Removal and Assembly. The order and method of removing and refitting components and accessories, together with details of any special precautions to be observed.

1.8 Overhaul Periods. A list of the recommended periods at which components and accessories should be overhauled or renewed.

1.9 Line Repairs. Repairs of a temporary or minor nature which, in the opinion of the constructor, could be applied to the aircraft whilst remote from suitable facilities.

1.10 General Procedures. The method of applying general procedures such as system testing during ground running, checks after a heavy landing, change of role, symmetry checks, weighing and determination of centre of gravity and salvage considerations, such as lifting and shoring.

1.11 Details of crating and unpacking of components, as considered necessary ; conditions of storage, with recommended limiting periods, and component dimensions and weights.

1.12 Compliance. The manner of complying with the above requirements should be such that it is primarily directed to the Licensed Aircraft Engineer(s) or member(s) of an Approved Inspection Organisation who will be responsible for maintaining a complete aircraft in the state of airworthiness before the aircraft, its components and accessories, as applicable, are submitted for overhaul or are renewed. Data concerning the overhaul of the aircraft should not be given in this manual.

2 AIRCRAFT OVERHAUL MANUAL

2.1 **Aircraft Structures and Control Surfaces.** The extent of overhaul data for structures and control surfaces should be such as to ensure that owners and operators are made aware at an early stage of the recommended standard of overhaul required initially to ensure the continued airworthiness of the structures and control surfaces over a stated period of hours flying and/or elapsed calendar time, or at the termination of a specified number of flights and/or landings. Subsequent amendments should be made as necessary to acquaint owners and operators of the latest findings or experience so that the manual reflects current knowledge of the aircraft thereby enabling increases or decreases, as appropriate, to be made in the recommended periods.

2.2 **Integrity of Structures.** Information, as detailed below, should be provided initially for each main structure and each control surface.

2.2.1 Illustrations which show clearly the construction of the structures, with such descriptive text as is necessary to clarify the illustrations and to draw attention to those parts which require detailed attention during overhaul.

2.2.2 Diagrams showing those parts of the structure to which access cannot be gained through the access doors and inspection panels normally provided, the diagrams being supplemented by a table defining the limits of inaccessibility.

2.2.3 Diagrams showing structures classified as primary and secondary.

2.2.4 Tables showing the recommended limiting periods at which designated parts of the structure should be overhauled in compliance with the standards given in the following paragraphs.

2.2.5 Text giving the methods and the extent of dismantling necessary to gain access to normally inaccessible structure, e.g. whether by removal of skin, by provision of additional panels, removal of fuel tanks, etc., and detailing any special opportunities of gaining access to normally inaccessible structure, e.g. during any component change programme.

2.2.6 A tabulated schedule of overhaul, relating to paragraphs 2.2.2 and 2.2.4, which defines the overhaul work and inspections and tests necessary after the normally inaccessible structure has been reached, and the method of implementing the schedule.

2.2.7 Text defining the applicability of special inspection techniques, e.g. radiographic and ultrasonic testing, with a proven technique of examination where such processes are required. The limitations of such processes and limits of their applicability should be clearly defined. Any special techniques necessary for proving the serviceability of castings, forgings, tubular members, etc., should be given.

2.2.8 Text detailing the protective treatment to be used to restore the original standard of protection, the final inspection of the structure or control surfaces, and the methods of closing structure which has been opened.

2.2.9 Details regarding the correlation of the bolt/joint overhaul programme (see paragraph 2.3.1) with the prescribed sampling programme, and the necessity to overhaul accessories and equipment in normally inaccessible structure at the structure overhaul periods.

2.3 Integrity of Attachment and Joint Assemblies

2.3.1 Diagrams showing the positions of all bolt and stud holes in spar booms, other primary structure, and in such secondary structure where, if failure were to occur, the integrity of associated primary structure might be affected and, by suitable annotation or by the use of keys, show :—

- (i) which bolt or stud holes are accessible or normally inaccessible (see paragraph 2.2.2),

- (ii) the size of the bolt, or stud hole,
- (iii) whether or not bushed,
- (iv) types of materials forming the mating surfaces,
- (v) original fits and clearances of bolts/bushes/studs in the holes, together with dimensional limits,
- (vi) a reference which will identify the holes or groups of holes.

2.3.2 Using the reference in paragraph 2.3.1 (vi), tables giving the total number of holes, recommended number of bolts or studs to be withdrawn from each group for operators having fleets of 2, 5, 10 and 20 aircraft, recommended number of bushes to be withdrawn, and recommended number of hours flying, flights, landings and/or the elapsed time at which bolts, studs or bushes should be withdrawn, having regard to the possibility of fatigue, fretting and corrosion.

2.3.3 Where an arrangement has been made between operators by the constructor for a shared programme of bolt and hole sampling, it is recommended that details of the programme be provided.

2.3.4 Text detailing the methods and extent of dismantling necessary to gain access to the nominated bolts or studs where this differs from paragraph 2.2.5.

2.3.5 Text detailing precautions necessary during the removal of bolts or studs, special tools or equipment necessary, the recommended inspection and crack detection procedure, e.g. penetrant or fluorescent dyes, special optical instruments, etc., salvage methods and limitations, schedule of oversize bolts, studs, and bushes available, protective treatment, methods of re-assembly and locking, including torque loading data, and details of recording schemes to identify the bolts, studs or holes examined.

2.4 **Scrap Lives.** A schedule detailing those parts of the structure which are to be replaced by new parts and the recommended periods of renewal.

2.5 **Aircraft Systems.** Details of recommended overhaul practices for such parts as flying controls, pipes and electrical cable installations.

3 AIRCRAFT REPAIR MANUAL

3.1 This manual should be confined to describing the repairs that can be applied to the aircraft structure and components, and to those parts of the systems and installations the design of which is the responsibility of the aircraft constructor, e.g. control tubes, levers and bearings, metal pipes, electrical conduits, engine cowlings, engine mountings and fluid tanks.

3.2 **Introduction.** General notes on the contents and usage of the manual.

3.3 **General Information.** Details of recommended repair procedures and practices which have a general application, with diagrams showing :—

- (i) Structures classified as primary and secondary with areas or parts where repairs are not permissible clearly defined.
- (ii) The construction of main structures and components with station positions which define the extent of skin panels, and the construction of primary longitudinals, frames, stringers and ribs, with the kinds and dimensions of the materials used.
- (iii) Tables of standard and special extruded sections with, where applicable, approved alternatives.
- (iv) Tables of rivets for each part of the structure, with information on where, and to what extent, oversize rivets can be used.

- 3.3.1 Details of process specifications, heat treatment procedures, protective treatment requirements, precautions necessary during repairs, e.g. damage by drilling into hidden structures and building in assembly stresses, details of special processes such as metal-to-metal bonding, welding, sealing of pressurised structures, etc.
- 3.4 **Preparation for Repair.** Details of, for example, the inspection necessary before repair, damage assessment standards, methods of supporting the structure, alignment and geometry checks, material allowance for dressing of damage, and limits of wear.
- 3.5 **Tools and Equipment.** A list of tools and equipment necessary for applying repairs, with details of their purpose and method of use.
- 3.6 **Temporary Repairs.** Details of repairs of a temporary nature permitting the aircraft to return to base for a permanent repair.
- 3.7 **Standard Repairs.** Details of repairs which can, within defined limits, be applied, as applicable, to various structures, systems and installations.
- 3.8 **Minor Repairs.** Details of permanent repairs which apply only to specified parts of the structure or particular components. Each part of the aircraft structure, its systems and installations should be considered, the sequence of sub-division of this section following that used in the Maintenance Manual. The type of repair included should be such as to obviate the need for extensive dismantling or the use of special jigs or equipment.
- 3.9 **Major Repairs.** Details of permanent repairs which would normally only be completed at the main base, e.g. those which would require the use of special jigs and equipment.
- 3.10 **Checking and Testing after Repair.** Details of those checks or tests necessary after repair, e.g. structure alignment checks, adjustment of control surface balance and fuselage pressure testing.
- 3.11 **General.** The repair schemes specified in paragraphs 3.6 to 3.9 should, as far as possible, be diagrammatically presented with text matter adjacent, this giving details of negligible damage, the limits of repairable damage, the applicability of the particular repair and the procedure involved in its embodiment.
- 4 **ENGINE MANUALS** Engine Manuals should contain descriptive, servicing, maintenance, and overhaul data, and similar data relating to those components and accessories, either on the engine or in the power unit, in respect of which an application for design approval has been made by the engine constructor. Such accessory data should conform to the requirements of paragraph 6.
- 4.1 **Engine Maintenance Manual**
- 4.1.1 **Introduction.** A brief description of the engine and engine systems.
- 4.1.2 **Description.** A detailed description of the construction of the engine and, as applicable, induction, injection, compression, ignition, exhaust, fuel, oil, cooling, control, de-icing and all other systems, including, where necessary, the purpose of individual parts.
- 4.1.3 **Operation.** The method whereby the components, systems and installations achieve their designed purpose.

- 4.1.4 **Installation.** Methods of uncrating, acceptance checking, deinhibiting, lifting and installing an engine into a power unit and the method of attaching accessories to an engine or power unit together with the checks necessary after such installation.
- 4.1.5 **Control.** Methods of starting, running, testing and stopping the engine and its components, systems and installations, with any special procedures and limitations.
- 4.1.6 **Servicing.** Details regarding servicing procedures, capacities of tanks, reservoirs, etc., types of fluid to be used, and the draining of collector tanks.
- 4.1.7 **Maintenance**
 - (i) **Schedule of Procedures.** Compliance to the standard required in paragraphs 1.6.1 and 1.6.2.
 - (ii) **Faults and Rectification.** Compliance to the standard required in paragraph 1.6.3.
 - (iii) **Adjustments, Component Removals and Testing.** The method of completing those adjustments, tests or removal of components, e.g. cylinders or combustion chambers, which may be required during service or to correct faults.
- 4.1.8 **Removal.** The order and method of removing the engine from a power unit and accessories from either the engine or the power unit, with the methods of engine lifting, inhibiting and crating for return to manufacturer or base.
- 4.1.9 **Tools and Equipment.** Tools and equipment necessary for maintenance with details of their purpose and method of use.
- 4.1.10 **Overhaul Periods.** The recommended periods at which the engine and accessories should be removed for overhaul or replacement of parts.
- 4.2 **Engine Overhaul Manual**
 - 4.2.1 **Tools and Equipment.** Tools and equipment necessary for overhaul and testing, with details of their purpose and method of use.
 - 4.2.2 **Dismantling.** The order and method of dismantling for overhaul.
 - 4.2.3 **Cleaning, Viewing and Inspection.** The materials and apparatus to be used, the standards to be observed during overhaul, and the standards and methods of inspection.
 - 4.2.4 **Fits and Clearances.** Details of all relevant fits and clearances.
 - 4.2.5 **Repair and Salvage Schemes.** Details of all applicable repair and salvage schemes.
 - 4.2.6 **Re-assembly.** Description of the order and method of assembly at overhaul.
 - 4.2.7 **Testing.** Details of the standards to be observed, the method of completing tests, and a list of faults which may occur during testing, together with possible causes and methods of rectification.
 - 4.2.8 **Storage Conditions and Limiting Periods.** Details of the conditions of storage and the recommended limiting storage periods.
- 5 **PROPELLER MANUALS** Propeller manuals should contain descriptive, servicing, maintenance and overhaul data and similar data relating to those accessories concerned with the functioning and control of the propeller in respect of which an application for design approval has been made ; such accessory data should conform to the requirements of paragraph 6.
- 5.1 **Propeller Maintenance Manual**
 - 5.1.1 **Introduction.** A brief description of the propeller and propeller systems.
 - 5.1.2 **Description.** A detailed description of the construction of the propeller.

- 5.1.3 **Operation.** The method whereby the propeller and the propeller systems achieve their designed purpose.
- 5.1.4 **Installation.** The method of uncrating, acceptance checking, lifting and installing the propeller.
- 5.1.5 **Control.** The method of checking the operation of the propeller during engine running, with details of any special procedures and limitations.
- 5.1.6 **Maintenance**
- (i) **Schedule and Procedures.** Compliance to the standard required in paragraphs 1.6.1 and 1.6.2.
 - (ii) **Faults and Rectification.** Compliance to the standard required in paragraph 1.6.3.
 - (iii) **Adjustments.** The methods of completing those adjustments which are necessary during service or to correct faults.
- 5.1.7 **Removal.** The order and method of removing the propeller from the engine.
- 5.1.8 **Overhaul Periods.** The recommended periods at which the propeller should be removed for overhaul.

5.2 **Propeller Overhaul Manual.** Compliance to the standard required in paragraph 4.2.

6 ACCESSORY, INSTRUMENT AND ELECTRICAL EQUIPMENT MANUALS

Separate manuals should normally be provided by the accessory, instrument or equipment manufacturer for (a) Maintenance and (b) Overhaul, the manuals containing data which conforms to the standard indicated by the subjects detailed below, in so far as applicability can exist.

6.1 Maintenance Manuals

- 6.1.1 **Description, Operation and Data**
- Description
 - Operation
 - Data
- 6.1.2 **Unpacking**
- 6.1.3 **Acceptance Checks**
- 6.1.4 **Storage Instructions**
- Conditions
 - Limiting Periods (recommended)
- 6.1.5 **Checks/Tests Before Installation**
- 6.1.6 **Installation**
- 6.1.7 **Checks/Tests After Installation**
- 6.1.8 **Operating Instructions**
- 6.1.9 **Maintenance**
- Schedule (recommended)
 - Procedures
- 6.1.10 **Trouble Shooting**
- 6.1.11 **Removal**
- 6.1.12 **Bench Checks**
- 6.1.13 **Overhaul Periods (recommended)**
- 6.1.14 **Return to Manufacturer or Base**

6.2 Overhaul Manuals

6.2.1 Description, Operation and Data

Description
Operation
Data

6.2.2 Disassembly (this to include any checks or tests considered necessary before disassembly is commenced)

6.2.3 Cleaning

6.2.4 Inspection/Check

6.2.5 Repair

6.2.6 Assembly

6.2.7 Fits and Clearances

6.2.8 Testing

6.2.9 Trouble Shooting

6.2.10 Storage Instructions

Conditions

Limiting Periods (recommended)

6.2.11 Special Tools, Fixtures and Equipment

6.2.12 Schedule of Overhaul Periods

CHAPTER A6—3

PERIODS BETWEEN OVERHAUL

1 The periods between overhaul of aircraft component parts shall be approved by the Board ; this shall apply to such parts as may tend to become unairworthy after a given period of service unless they are completely dismantled, examined in detail, reassembled within permissible tolerances and subjected to functional tests.

2 The initial period will be determined by the Board in collaboration with the constructor, and will normally be based on the result of type approval tests. This period may be varied from time to time by the Board in the light of operational experience, and may be extended subject to compliance with the following conditions :—

2.1 Applications shall be made in writing to the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2, giving particulars of the extension required and documentary evidence that the parts concerned have completed the previously approved period satisfactorily.

2.2 If the documentary evidence referred to in paragraph 2.1 above is satisfactory to the Board, the applicant will be authorised in writing by the Board to permit a stated number of the parts to continue in service for the proposed extended period.

2.3 The applicant shall keep a careful record of the behaviour of the parts during the extended period of service, and shall furnish the Board with a copy of this record.

2.4 When the parts have completed the extended period of service, the applicant shall prepare a detailed report on their condition. This report and the parts shall then be held at the disposal of the Board.

3 On the basis of the record and report required by paragraphs 2.3 and 2.4 above, the Board will decide to what extent the period between overhaul can be extended:

CHAPTER A6—4

MAINTENANCE OF AIRCRAFT

- I MAINTENANCE SCHEDULES** The operator of an aircraft registered in the United Kingdom which is to be used for the purpose of public transport or dropping or projecting any material for agricultural, public health, or similar purposes shall obtain from the Board written approval of maintenance schedules in respect of the aircraft. Maintenance schedules will only be approved providing the following Requirements are complied with and provided the Board is satisfied as to the engineering competence of the operator (see paragraph 2).

- 1.1 The operator of the aircraft shall prepare in duplicate, and submit to the Board, written maintenance schedules containing the following information :—
- 1.1.1 The registered name and address of the operator.
 - 1.1.2 An identity or reference number, issue number and date.
 - 1.1.3 The type of aircraft.
 - 1.1.4 The type of engines.
 - 1.1.5 The type of propellers (where applicable).
 - 1.1.6 The route on, or the areas in, which the aircraft is to be operated.
 - 1.1.7 The class of work to be undertaken in respect of paragraph 1.1.6
 - 1.1.8 Periods at which each part of the aircraft, including its engines, propellers, radio stations, accessories, instruments, equipment and apparatus, and their installation, shall be inspected.
 - 1.1.9 Type and degree of inspection required by paragraph 1.1.8.
 - 1.1.10 Periods at which items mentioned in paragraph 1.1.8 shall, as appropriate, be checked, cleaned, lubricated, adjusted and tested.
 - 1.1.11 Periods at which overhauls and/or replacement by new or overhauled parts shall be made. (Subsequent amendments to these periods shall conform with paragraph 2.1 of Chapter A6—3.)
- 1.2 Amendments which may from time to time be required by the Board shall be incorporated in the maintenance schedule.
- 1.3 The data contained in an approved schedule shall be reviewed periodically by the operator to ensure that it is amended to reflect, for example, maintenance experience, the effect of the embodiment of modifications or the incorporation of the requirements of manufacturer's bulletins. Such amendments shall not be embodied without the written consent of the Board.

- 2 CONDITIONS OF APPROVAL AND ASSESSMENT OF ENGINEERING COMPETENCE** Before a schedule is approved, and as a condition of satisfactory recommendation for the grant of an Air Operator's Certificate, the operator shall ensure that the following conditions are complied with to the satisfaction of the Board.

NOTE : Article 3A of the Air Navigation Order, 1960, specifies that aircraft having a total weight authorised of more than 5,000 lb. shall not fly for the purpose of public transport otherwise than under and in accordance with the terms of an Air Operator's Certificate. Before issuing an Air Operator's Certificate the Director of Aviation Safety, Ministry of Aviation, will require to be satisfied as to the competence of the operator to secure the safe operation of his aircraft. In this connection, so far as matters of engineering competence are concerned, the Director will seek the advice of the Air Registration Board.

- 2.1 A sufficient number of skilled engineering staff, including appropriately licensed aircraft engineers, shall be available for the work to be undertaken.

- 2.2 Sufficient hangar space shall be available for the work to be undertaken.

- 2.3 Sufficient equipment and workshop facilities shall be available for the work to be undertaken.
- 2.4 Suitable quarantine and bonded stores shall be provided together with a suitable stores records system.
- 2.5 The operator shall have available current technical literature and drawings relating to the aircraft concerned, and shall have an arrangement with the manufacturer to be notified of all amendments or re-issues to such literature and drawings.
- 2.6 A suitable system of technical records shall be maintained and sufficient office accommodation made available for inspection staff and licensed aircraft engineers to perform their duties effectively.
- 2.7 Where an operator intends carrying out any part of the maintenance, specified in the Approved Maintenance Schedule, at a route station, he shall ensure that acceptable facilities are provided and that appropriately licensed aircraft engineers are available for certification purposes.
- 2.8 Such additional maintenance facilities as may, in the opinion of the Board, be necessary for the particular type of operation, shall be provided.

3 MAINTENANCE OF APPROVAL If, in the opinion of the Board, the conditions on which initial approval were based are not maintained, the Board may cancel the approval and, in respect of the Air Operator's Certificate, recommend to the Director of Aviation Safety that the Certificate be suspended or revoked.

4. CERTIFICATE OF MAINTENANCE

4.1 The form of the Certificate of Maintenance shall be as follows:—

CERTIFICATE OF MAINTENANCE

Aircraft Type.....Nationality and Registration Marks.....
Check completed prior to issue.....

I/We hereby certify that the above aircraft has been maintained and inspected in accordance with the approved maintenance schedule.

Category	Licence No.	Signature	Date
"A" (Radio)
"X" (Automatic Pilots)
"X" (Compasses)
"X" (Instruments)
"X" (Electrical)
"C" (Engines)
"A" (Aircraft)

Period of validity.....days or upon completion by the aircraft of.....
flying hours from the date of certification, whichever is the sooner.

NOTE : The categories of signatories required after each check are specified in the approved maintenance schedule and to enable the commander of the aircraft or any other authorised person to be satisfied that the necessary certifications of maintenance have been issued after a particular check, this information should be repeated in the technical log (Chapter A6-8). Spaces for particular signatories need not be included in the form of certificate if there is no requirement for them.

4.2 **Persons Competent to Issue a Certificate of Maintenance.** A Certificate of Maintenance shall be issued only by the following :—

4.2.1 The holder of an appropriate aircraft maintenance engineer's licence or aircraft radio maintenance engineer's licence granted or rendered valid in the United Kingdom, or the holder of such licence granted under the law of any country prescribed by the Minister of Aviation.

4.2.2 A person authorised by the Minister of Aviation to issue a certificate in a particular case.

4.3 **Retention of Documents.** Certificates of Maintenance shall be preserved by the operator of the aircraft for a period of two years following the expiry of the period of validity of the certificate, and for such further period as may be required in a particular case.

CHAPTER A6—5

SPECIFICATIONS (INSTRUMENTS, EQUIPMENT AND ACCESSORIES)

- 1 An instrument, item of equipment or accessory, which is required to be approved, shall conform to a specification published or approved by the Board (see also paragraph 3.4 of Chapter A3—3).
- 2 A specification will be approved if, in the opinion of the Board, the instrument, item of equipment, or accessory, constructed in accordance with such a specification, is suitable for the purpose for which it is intended.
- 3 Application for approval, and two copies of the specification, shall be addressed to the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2.
- 4 A specification submitted for approval shall include the following information :—
 - (i) An identity or reference number, issue number and date.
 - (ii) A title describing the instrument, item of equipment, or accessory.
 - (iii) Particulars of the materials used in the construction.
 - (iv) Particulars relating to the design and method of construction.
 - (v) The nature and extent of tests to be applied to each instrument, item of equipment, or accessory.
 - (vi) Particulars of identity marks to be inscribed on each instrument, item of equipment or accessory.

CHAPTER A6—6

SPECIFICATIONS (MATERIALS)

- 1 Materials used in parts affected by airworthiness requirements shall conform to :—
 - (i) British Standards for Aircraft Materials, or
 - (ii) D.T.D. Specifications, or
 - (iii) Specifications approved by the Board, or
 - (iv) Specifications prepared according to the provisions of paragraph 2 of Chapter D4—1 by an Approved Design Organisation for a material which is to be used in a part designed within the terms of their approval.

- 2 A specification will be approved if, in the opinion of the Board, material accepted as complying with such a specification has the essential properties assumed in the technical investigation associated with the design approval.
- 3 Application for approval, and two copies of the specification, shall be addressed to the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2.
- 4 A specification submitted for approval shall, according to the material concerned, include such of the following information as is appropriate :—
 - (i) An identity or reference number, issue number and date.
 - (ii) A title describing the material.
 - (iii) The quality and/or chemical composition of the material.
 - (iv) The mechanical and/or physical properties of the material.
 - (v) The method of determining the mechanical and/or physical properties of the material.
 - (vi) Particulars of defects which render the material unsuitable.
 - (vii) Particulars of heat treatment and/or other manufacturing processes.
 - (viii) A table of manufacturing tolerances.
 - (ix) Particulars of such marking as will ensure identification of the material.

CHAPTER A6—7

CREW MANUALS

- 1 For every aircraft granted a certificate of airworthiness the aircraft constructor shall provide such instructions and information as may be necessary to enable the crew to acquire an understanding of the aircraft essential for its safe operation. The constructor may elect to produce the instructions and information in a manner suitable for direct inclusion in the Operations Manual but if produced as a separate document it shall be entitled "Crew Manual".
- 2 The instructions and information produced in accordance with this Chapter will normally be compiled and published under the authority of the Design Approval held by the constructor except that the Board may, at any time prior to the issue of a certificate of airworthiness, require the instructions and information to be submitted for the approval of the Board. The instructions and information must bear a statement signifying that they have been compiled in accordance with this Chapter and that their content and accuracy have received the approval for publication of the Approved Design Organisation and that the inclusion of an unapproved amendment will invalidate the initial approval ; this statement must be certified by the Approved Design Organisation. Two copies of such certified information must be lodged with the Board.
- 3 The Board reserves the right to investigate the content of any certified information and to require the embodiment of any amendment which is considered necessary to comply with the Requirements.
- 4 It shall be the responsibility of the constructor to obtain from the constructors of engines, propellers and radio and radar apparatus, and from the manufacturers of products which are approved under either the Accessory Procedure or the Component Procedure prescribed in Chapter A3—3, such certified information relating to their products as may be necessary for the completion of the manual.

- 5 The manual shall include a system of amendments.
- 5.1 The details of the system and the manner in which amendments are to be incorporated and recorded shall be adequately explained.
- 5.2 Amendments shall be subject to the approval procedure specified in paragraph 2 and shall be issued whenever necessary to ensure that the Manual continues to comply with the requirements of paragraph 1.
- 5.3 If a constructor does not intend in all cases to make the necessary changes immediately by means of a normal amendment consisting of reprinted pages, provision shall be made in the manual for the issue of temporary amendments. Temporary amendments must be printed on pages readily distinguishable from the ordinary pages. All changes made by means of a temporary amendment shall be superseded by the issue of a normal amendment within a period of six months.
- 6 In the event of the operator of an aircraft modifying the airframe, engines or equipment or introducing operational procedures peculiar to a particular type of operation, which changes have not been initiated by the constructor, the operator must :—
- (i) issue an amendment bearing a statement as to its technical accuracy and compliance with this Chapter and, for temporary amendments, ensure that the requirements of paragraph 5.3 are complied with ;
 - (ii) furnish the Board with two copies of the amendment ;
 - (iii) incorporate the amendment in the manual and record its incorporation in the appropriate amendment index.
- 7 Where the operator elects to include "Crew Manual" material in the Operations Manual, the following conditions shall apply :—
- (i) The parts of the Operations Manual containing the information which would otherwise be contained in a Crew Manual shall be subject to the requirements of this Chapter.
 - (ii) The operator shall furnish the Board with two copies of the appropriate parts of the Operations Manual and two copies of each amendment issued by him in accordance with paragraph 6, affecting such parts.
 - (iii) Any amendments issued in accordance with paragraph 6 and, unless they are inapplicable, any amendments issued by the constructor, must be incorporated in the Operations Manual.
- 8 The Manual shall be adequately illustrated and shall include such instructions and information as may be necessary to meet the requirements of paragraph 1. Manuals containing the information given in the Appendix to this Chapter would comply with this requirement subject to the applicability of the information to the type of aircraft concerned.
- 8.1 It is recommended that, so far as practicable, the format of the manual should follow S.B.A.C. Specification for Aircraft Technical Publications, issued by the Society of British Aircraft Constructors, or Specification for Manufacturers' Technical Data—Air Transport Association of America—Specification No. 100.
- 8.2 Information, or parts thereof, specified under paragraph 15 of the Appendix to this Chapter, headed "Flight Planning Data", may be omitted from the manual if it is contained in the Flight Manual.

- 8.3 Any other instructions and information may be omitted from the manual only if the Flight Manual contains all (not parts) of the information specified under any item in the Appendix, otherwise they must be reproduced in full so as to give an overall appraisal of a subject. In the event of any such omissions appropriate cross-references must be made to the Flight Manual.
- 8.4 The instructions and information in the manual and in the Flight Manual must be consistent.
- 8.5 A manual must be marked "Provisional" on the page and in the position normally occupied by the Approval Note, if it is published prior to the aircraft being fully certificated and the issue of a Flight Manual.
- 8.6 The instructions and information must be presented in a manner suitable for use by the crew ; it should give sufficient detail for a proper understanding of each subject, with particular emphasis on the instruments and controls in the flight crew compartment, but should not be compromised by superfluous detail regarding engineering and construction which is of no immediate concern to the crew ; the advice of the Board should be sought in cases of doubt.

APPENDIX TO CHAPTER A6—7

- 1 TITLE/FRONTISPIECE PAGE, to include the certified statement in accordance with paragraph 2 of this Chapter.
- 2 NOTES TO READER, covering conventions employed (e.g. that capital letters indicate markings and that indicated airspeeds, Mach. numbers, etc., are used), scope and use of the manual and list of contents.
- 3 INDEX OF AMENDMENTS (NORMAL) ISSUED BY CONSTRUCTOR
- 4 INDEX OF AMENDMENTS (TEMPORARY) ISSUED BY CONSTRUCTOR
- 5 INDEX OF AMENDMENTS (NORMAL) ISSUED BY OPERATOR
- 6 INDEX OF AMENDMENTS (TEMPORARY) ISSUED BY OPERATOR
- 7 LIST OF ASSOCIATED PUBLICATIONS
- 8 INTRODUCTION, providing a brief introduction to the aircraft, its structure, systems, equipment, and roles, including a three-view general arrangement drawing giving dimensions, weights, etc., and such illustrations as may be necessary to cover panel coding, bulkhead numbering and nomenclature.
- 9 FLIGHT CREW COMPARTMENT, covering lay-out, crew's stations, controls, equipment, instruments and lights with appropriate illustrations.
- 10 SYSTEMS AND EQUIPMENT, covering accommodation and equipment (including seating, galleys, doors and warning lights, etc.), air conditioning, auto pilot and/or flight system, communications, electrical power (including generation and distribution), emergency and survival equipment (including location and facilities available, etc.), fire protection (including engine and fuselage fire warning and extinguishing), flight controls, fuel, hydraulic power, ice and rain protection (including airframe, pitot heads, wind-

screens, etc.), landing gear, navigation (including navigational radio, instruments, radar, etc.), oxygen (including portable supplies), pitot-static (including supplies to fatigue meter, ice detection, etc.), pneumatic, power plant(s) (including auxiliary power units, starter pods, oil systems, etc.), vacuum and water (including waste disposal), etc., covering the following :—

10.1 **Description**, consisting of location of main components in diagram or table form ; technical description of the system or installation ; system and component functioning ; controls, indicators and instruments, and power (electric, hydraulic and/or pneumatic) supplies in diagram or table form (structural information should be given only as may be necessary for clarity).

10.2 **Ground Servicing**, consisting of items of system ground servicing that the crew may be required to supervise or carry out in the event of an unscheduled stop where full servicing facilities are not available ; location of system ground servicing points in diagram form, and system replenishing and off-loading.

10.3 **Management**, consisting of normal conditions before flight, in flight and after flight, and abnormal conditions (i.e. malfunctioning and abnormal external conditions which do not constitute an emergency (see paragraph 13)).

11 LIMITATIONS, as prescribed in the Flight Manual.

12 **HANDLING PROCEDURES**, covering general handling (techniques applicable to all procedures); departure (starting, taxiing and take-off) ; flight handling (normal climb and cruise and flight in adverse weather, etc.) ; arrival (descent, field approach and landing) ; abnormal conditions (feathering, unfeathering, re-lighting, asymmetric flight, auto-rotation, etc.) ; crew training (procedures outside normal operation but necessary for crew training), and ground handling (ground running and testing, ground manoeuvring and parking and mooring).

NOTE : Standard procedures, such as holding patterns, V.O.R. procedures, etc., which are considered to be part of basic piloting knowledge, may be omitted unless equipment is installed introducing new concepts.

13 **EMERGENCIES**, covering essential operating procedures for emergency conditions (but excluding abnormal conditions (see paragraph 12)). An emergency in this context is defined as a foreseeable but unusual situation in which immediate and precise action will substantially reduce the risk of a disaster ; those steps in which immediate action is essential to safety shall be distinguished from the steps which are taken subsequently.

14 **CHECK LISTS**, covering crew's check lists with transit checks where applicable.

15 **FLIGHT PLANNING DATA**, covering example calculations and flight plans, etc., scheduled performance and gross performance, fuel and oil consumption, etc.

16 **LOADING AND C.G. DATA** covering definitions, data, example calculations and typical loading examples and instructions for using the Weight and Centre of Gravity Schedule (Chapter A5—1) for all reasonable combinations of loading. In the case of aircraft in which provision is made for the carriage of freight, floor loading limitations and adequate information to enable the operator to position and secure parcels of freight.

CHAPTER A6—8

TECHNICAL LOGS

1. The operator of an aircraft registered in the United Kingdom which is to be used for the purpose of public transport or dropping or projecting any material for agricultural, public health or similar purposes shall provide a Technical Log which shall contain the following :—

1.1 The registered name and address of the operator and the nationality and registration marks of the aircraft.

1.2 A valid Certificate of Maintenance.

1.3 A record sheet in which can be entered :—

- (a) Any defect in any part of the aircraft or of its equipment, being a part to which a Maintenance Schedule relates.
- (b) A copy of the Certificate of Compliance required by Chapter A4—3 in respect of the work done for the rectification of defects. This shall be entered in such a position and manner as to be readily identifiable with the entry of the defect to which it relates.

1.4 A record sheet in which can be entered times at which flights begin and end.

1.5 A statement of the categories of signatories required for the certification of maintenance in respect of each check applicable.

1.6 A statement of the next check due in order to comply with the check cycle of the Approved Maintenance Schedule.

2. All entries in Technical Logs required by this Chapter shall be made in duplicate with provision for one copy of each entry to be removed and retained elsewhere.

CHAPTER A7—1

DESIGN ORGANISATIONS (AIRCRAFT AND AIRCRAFT COMPONENTS)

1. **GENERAL** The design organisation of a firm may be approved to furnish reports that the design of an aircraft or aircraft component (but see also Chapters A7—2, A7—3 and A7—4) complies with the Board's published Requirements and, in particular cases, with such other requirements as the Board may consider appropriate. A firm may be approved for this purpose subject to compliance with the conditions set out in the following paragraphs.

NOTE : (1) The following conditions are intended to apply when the firm is engaged in the design of complete aircraft. Firms engaged in aircraft component design will be required to comply with relevant conditions ; but in respect of paragraphs 3.4, 3.7 and 3.8, will only be expected to comply as applicable to the nature of the work undertaken.

(2) This form of approval may also enable firms to certify to the Board in respect of the following types of work :—

- (i) Repair schemes developed from the Repair Manual.
- (ii) Alterations to furnishings and seating layout.
- (iii) Alterations to installations and equipment to suit specific applications or to extend the approval of a particular aircraft.
- (iv) Such other modifications as are agreed individually by the Board.

2. **APPLICATION.** A.R.B. Form 466, copies of which may be obtained from the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2, shall be completed and returned to the Board.

3 REQUIREMENTS FOR THE GRANT OF APPROVAL

- 3.1 The organisation of the firm shall, in the opinion of the Board, be such as to ensure that, in all matters affecting airworthiness, full and efficient co-ordination exists within the design office and related technical departments, and between the design office and other departments of the firm.
- 3.2 The qualifications and experience of the design office staff shall, in the opinion of the Board, be adequate to conduct the work involved in establishing compliance with the Requirements, and shall be such as to ensure that good judgment is exercised with a full appreciation of current aeronautical practice in design matters, whether specifically covered by the Requirements or not. The Board shall be satisfied that the management of the organisation will be conducted with due regard to the character of airworthiness requirements.
- 3.3 The design organisation shall be of sufficient strength as may reasonably be expected to be necessary to undertake the airworthiness investigation of the class of work for which approval is sought.
- 3.4 The design office shall include (as applicable) specialists qualified in all branches of aeronautics; in particular aerodynamics, metallurgy, strength and stiffness, engine and other installations, and authors, technical writers and/or editors for the preparation of manuals.
- 3.5 The applicant for approval shall nominate the following persons :—
(i) The person in direct charge of the design organisation.
(ii) The technical director to whom the person directly in charge of the design organisation is responsible.
(iii) Other senior members of the design organisation and of related departments with a description of their duties.
- 3.6 The design office shall be so organised that all calculations and drawings on which the airworthiness of the aircraft depends are independently checked.
- 3.7 The firm shall be able to call upon the services of flight test personnel whose experience and qualifications are acceptable to the Board.
- 3.8 The firm shall have facilities, or access to suitable approved facilities, for making such tests as are necessary to establish compliance with the Requirements, including facilities for structural and metallurgical testing, flight testing, weighing and determining the position of the centre of gravity of an aircraft, when the terms of approval include this type of work.
- 3.9 The aircraft manufacturing firm shall have facilities, or access to suitable approved facilities, for producing and publishing the appropriate technical information relating to the safe operation, maintenance, overhaul and repair of the aircraft. (The Chief Designer shall, before the certificate of airworthiness is issued, certify to the Board that such manuals have been published and are in accordance with the standards defined in Chapters A6—2 and A6—7.) Component manufacturing firms shall have similar facilities in relation to the items for which the firm is approved (and shall furnish the constructor of the aircraft with such information).
- 3.10 Design records shall be such that proper correlation of drawings and amendments with the design records is ensured.

4 REQUIREMENTS FOR THE MAINTENANCE OF APPROVAL

- 4.1 The design organisation shall be maintained at the standard originally approved by the Board, and the Board's representatives shall, at all reasonable times, be given the access necessary to establish this fact. In any case material changes in the constitution of the design staff shall be notified to the Board in writing.
- 4.2 The firm shall consult the Board if any difficulty about the interpretation of the Requirements, or on any airworthiness matter which in their experience involves new problems or techniques. If, subsequent to the approval of an aircraft or aircraft component and irrespective of whether the aircraft concerned is registered in this country or overseas, the firm becomes aware of defects which affect the continuing airworthiness of the product, the firm shall advise the Board in order that the appropriate joint action may be taken.
- 4.3 The firm shall keep copies of original drawings until it is reasonably certain that all existing aircraft have been brought into conformity with any amended drawings and shall not destroy design records and drawings without the authorisation of the Board.
- 4.4 At all reasonable times the Board's authorised representatives shall have access to all drawings, calculations, reports and records relating directly or indirectly to the airworthiness of an aircraft or component, but in any case the design organisation shall keep the Board's representatives fully informed of all defects, incidents and problems which arise during development and which could have an appreciable effect on the airworthiness of the aircraft or component. The Board's representatives shall also have the right to witness all tests in any way associated with establishing the airworthiness of the aircraft or component.
- 4.5 The Board may withdraw, suspend or modify the terms of approval if, in the opinion of the Board, the conditions on which approval is granted are not met. The terms of approval may also be changed as a result of changes in the firm's undertakings.

CHAPTER A7—2

DESIGN ORGANISATIONS (ENGINES AND PROPELLERS)

- 1 **GENERAL** The design organisation of a firm may be approved to furnish reports to the Board that the design of an engine or propeller complies with the Board's published Requirements, and in particular cases, with such other requirements as the Board may consider appropriate. A firm may be approved for one or more of these purposes subject to compliance with the conditions set out in the following paragraphs.
- 2 **APPLICATION** A.R.B. Form 466, copies of which may be obtained from the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2, shall be completed and returned to the Board.
- 3 **REQUIREMENTS FOR THE GRANT OF APPROVAL**
- 3.1 The organisation of the firm shall, in the opinion of the Board, be such as to ensure that, in all matters affecting airworthiness, full and efficient co-ordination exists within the design office and related technical departments, and between the design office and other departments of the firm.

- 3.2 The qualifications and experience of the design office staff shall, in the opinion of the Board, be adequate to conduct the work involved in establishing compliance with the Requirements, and shall be such as to ensure that good judgment is exercised with a full appreciation of current aeronautical practice in design matters, whether specifically covered by the Requirements or not. The staff shall also include authors, technical writers and/or editors for the preparation of manuals. The Board shall be satisfied that the management of the organisation will be conducted with due regard to the character of airworthiness requirements.
- 3.3 The design organisation shall be of sufficient strength as may reasonably be expected to be necessary to undertake the airworthiness investigation of the class of work for which approval is sought.
- 3.4 The organisation shall include specialists qualified in all branches of engine or propeller design, as appropriate; in particular performance estimation, stress analysis, metallurgy and test procedures.
- 3.5 The applicant for approval shall nominate the following persons:—
- (i) The person in direct charge of the design organisation.
 - (ii) The technical director to whom the person directly in charge of the design organisation is responsible.
 - (iii) Other senior members of the design organisation and of related departments, with a description of their duties.
- 3.6 The design office shall be so organised that all calculations and drawings on which the airworthiness of an engine, propeller or related component depends are independently checked.
- 3.7 The firm shall have facilities, or access to suitable approved facilities, for making such tests as are necessary to establish compliance with the Requirements.
- 3.8 The firm shall have facilities, or access to suitable approved facilities, for producing and publishing the appropriate technical information relating to the safe operation, maintenance, overhaul and repair of the items for which the firm is approved, and shall furnish the constructor of the aircraft with such information.
- 3.9 Design records shall be such that proper correlation of drawings and amendments with the design records is ensured.

4 REQUIREMENTS FOR THE MAINTENANCE OF APPROVAL

- 4.1 The design organisation shall be maintained at the standard originally approved by the Board, and the Board's representatives shall, at all reasonable times, be given the access necessary to establish this fact. In any case material changes in the constitution of the design office shall be notified to the Board in writing.
- 4.2 The firm shall consult the Board if in any difficulty about the interpretation of the Requirements, or on any airworthiness matters which in their experience involve new problems or techniques. If, subsequent to the approval of an engine or propeller and irrespective of whether the aircraft concerned is registered in this country or overseas, the firm becomes aware of defects which affect the continuing airworthiness of the product, the firm shall advise the Board in order that the appropriate joint action may be taken.

- 4.3 The firm shall keep copies of original drawings until it is reasonably certain that all existing components, engines, and propellers have been brought into conformity with any amended drawings and shall not destroy design records and drawings without the authorisation of the Board.
- 4.4 At all reasonable times the Board's authorised representatives shall have access to all drawings, calculations, reports and records relating directly or indirectly to the airworthiness of an engine or propeller, but in any case the design organisation shall keep the Board's representatives fully informed of all defects, incidents and problems which arise during development and which could have an appreciable effect on the airworthiness of the engine or propeller. The Board's representative shall also have the right to witness all tests in any way associated with establishing the airworthiness of the engine or propeller.
- 4.5 The Board may withdraw, suspend or modify the terms of approval if, in the opinion of the Board, the conditions on which approval is granted are not met. The terms of approval may also be changed as a result of changes in the firm's undertakings.

CHAPTER A7—3

DESIGN ORGANISATIONS (INSTRUMENTS, EQUIPMENT AND ACCESSORIES)

- 1 **GENERAL** The design organisation of a firm may be approved to certify that the design of an instrument, item of equipment or accessory, conforms to specifications published or approved by the Board. A firm may be approved for these purposes subject to compliance with the conditions set out in the following paragraphs.
- 2 **APPLICATION** A.R.B. Form 466, copies of which may be obtained from the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2, shall be completed and returned to the Board.
- 3 **REQUIREMENTS FOR THE GRANT OF APPROVAL**
- 3.1 The organisation of the firm shall, in the opinion of the Board, be such as to ensure that, in all matters affecting airworthiness, full and efficient co-ordination exists within the design office and related technical departments, and between the design office and other departments of the firm.
- 3.2 The qualifications and experience of the design office staff shall, in the opinion of the Board, be adequate to conduct the work involved in establishing compliance with specifications, and shall be such as to ensure that good judgment is exercised with full appreciation of current aeronautical practice in design matters, whether specifically covered by specifications or not. The staff shall also include authors, technical writers and/or editors for the preparation of manuals. The Board shall be satisfied that the management of the organisation will be conducted with due regard to the character of airworthiness requirements.
- 3.3 The design organisation shall be of sufficient strength as may reasonably be expected to be necessary to undertake the airworthiness investigation of the class of work for which approval is sought.

- 3.4 The applicant for approval shall nominate the following persons :—
- (i) The person in direct charge of the design organisation.
 - (ii) The technical director to whom the person directly in charge of the design organisation is responsible.
 - (iii) Other senior members of the design organisation and of related departments, with a description of their duties.
- 3.5 The design office shall be so organised that all tests are carried out in conjunction with the Inspection Organisation and that test reports are independently checked.
- 3.6 The firm shall have facilities, or access to suitable approved facilities, for such tests as are necessary to establish compliance with the specifications.
- 3.7 The firm shall have facilities, or access to suitable approved facilities, for producing and publishing the appropriate manuals relating to the safe operation, maintenance, overhaul and repair of the items for which the firm is approved, and shall furnish the constructor of the aircraft with such information.
- 3.8 Design records shall be such that proper correlation of drawings and amendments with the design records is ensured.

4 REQUIREMENTS FOR THE MAINTENANCE OF APPROVAL

- 4.1 The design organisation shall be maintained at the standard originally approved by the Board, and the Board's representatives shall, at all reasonable times, be given the access necessary to establish this fact. In any case material changes in the constitution of the design staff shall be notified to the Board in writing.
- 4.2 The firm shall consult the Board if in any difficulty about the interpretation of a specification or when in doubt about matters associated with specifications which in their experience involve new problems or techniques.
- 4.3 The firm shall not destroy design records and drawings without the authorisation of the Board.
- 4.4 At all reasonable times the authorised representatives of the Board shall have access to all drawings, calculations, reports and records relating directly and indirectly to the airworthiness of the instruments, equipment and accessories, but in any case the design organisation shall keep the representatives of the Board fully informed of all defects and incidents which occur during the design and development which have a bearing on the airworthiness of the instruments, equipment or accessories. The Board's representatives shall also have the right to witness all tests in any way associated with establishing the airworthiness of the instruments, equipment or accessories.
- 4.5 The Board may withdraw, suspend or modify the terms of approval if, in the opinion of the Board, the conditions on which approval is granted are not met. The terms of approval may also be changed as a result of changes in the firm's undertakings.

CHAPTER A7—4

DESIGN ORGANISATIONS (RADIO APPARATUS)

- 1 **GENERAL** The design organisation of a firm may be approved to furnish reports to the Board that the design of radio apparatus, or component parts of radio apparatus, complies with the Requirements, and, in particular cases, with such other requirements as the Board may consider appropriate. A firm may be approved for these purposes, subject to compliance with the conditions set out in the following paragraphs.
- 2 **APPLICATION** A.R.B. Form 466, copies of which may be obtained from the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2, shall be completed and returned to the Board.
- 3 **REQUIREMENTS FOR THE GRANT OF APPROVAL**
 - 3.1 The organisation of the firm shall, in the opinion of the Board be such as to ensure that, in all matters affecting airworthiness, full and efficient co-ordination exists within the design office and related technical departments, and between the design office and other departments of the firm.
 - 3.2 The qualifications and experience of the design office staff shall, in the opinion of the Board, be adequate to conduct the work involved in establishing compliance with the Requirements, and shall be such as to ensure that good judgment is exercised with a full appreciation of current practice in aircraft radio design matters, whether specifically covered by the Requirements or not. The staff shall also include authors, technical writers and/or editors for the preparation of manuals. The Board shall be satisfied that the management of the organisation will be conducted with due regard to the character of airworthiness requirements.
 - 3.3 The design organisation shall be of sufficient strength as may reasonably be expected to be necessary to undertake the airworthiness investigation of the class of work for which approval is sought.
 - 3.4 The applicant for approval shall nominate the following persons :—
 - (i) The person in direct charge of the design organisation.
 - (ii) The technical director to whom the person directly in charge of the design organisation is responsible.
 - (iii) Other senior members of the design organisation and of related departments, with a description of their duties.
 - 3.5 The design office shall be so organised that all calculations and drawings on which the airworthiness of radio apparatus depends are independently checked.
 - 3.6 The firm shall have facilities, or access to suitable approved facilities, for making such tests as are necessary to establish compliance with the Requirements.
 - 3.7 The firm shall have facilities, or access to suitable approved facilities, for producing and publishing the appropriate manuals relating to the maintenance and overhaul of the items for which the firm is approved and shall furnish the constructor of the aircraft with such information.
 - 3.8 Design records shall be such that proper correlation of drawings and amendments with the design records is ensured.

4 REQUIREMENTS FOR THE MAINTENANCE OF APPROVAL

- 4.1 The design organisation shall be maintained at the standard originally approved by the Board, and the Board's representatives shall, at all reasonable times, be given the access necessary to establish this fact. In any case material changes in the constitution of the design staff shall be notified to the Board in writing.
- 4.2 The firm shall consult the Board if in any difficulty about the interpretation of the Requirements, or on any matter on which the airworthiness of the radio apparatus depends, that in their experience involves new problems and techniques.
- 4.3 The firm shall keep copies of original drawings until it is reasonably certain that all existing radio apparatus, or component parts of radio apparatus, have been brought into conformity with any amended drawings, and shall not destroy design records and drawings without the authorisation of the Board.
- 4.4 At all reasonable times the authorised representatives of the Board shall have access to all drawings, calculations, reports and records relating directly and indirectly to the airworthiness of radio apparatus or component parts of radio apparatus, but in any case the design organisation shall keep the representatives of the Board fully informed of all defects and incidents which occur during the design and development and which have a bearing on the airworthiness of the radio equipment. The Board's representatives shall also have the right to witness all tests in any way associated with establishing the airworthiness of the equipment.
- 4.5 The Board may withdraw, suspend or modify the terms of approval if, in the opinion of the Board, the conditions on which approval is granted are not met. The terms of approval may also be changed as a result of changes in the firm's undertakings.

CHAPTER A7—5

INSPECTION ORGANISATIONS

- 1 GENERAL The inspection organisation of a firm may be approved by the Board to furnish reports in respect of the construction, repair and overhaul of aircraft and of materials and parts used for such purposes. A firm may be approved subject to compliance with the conditions set out in the following paragraphs.

2 APPLICATION

- 2.1 **Inspection Organisations in the United Kingdom.** A.R.B. Form 454, copies of which may be obtained from the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2, shall be completed and returned to the Board.
- 2.2 **Inspection Organisations Outside the United Kingdom.** A.R.B. Form 454A, copies of which may be obtained from the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2, shall be completed and returned to the Board.

NOTE : The Board will require the applicant to meet all costs incurred in relation to the investigation of the application and of any subsequent supervision.

3 REQUIREMENTS FOR THE GRANT OF APPROVAL

3.1 Inspection Organisation. The organisation of the inspection department and other related departments shall be such as to ensure full and efficient co-ordination.

3.1.1 The applicant for approval shall nominate the following persons :—

- (i) The Chief Inspector.
- (ii) The technical director to whom the Chief Inspector is responsible.
- (iii) Senior members of the inspection department, with a description of their duties.

NOTE : Where a quality controller fills the role of (i) above, this may be acceptable to the Board.

3.1.2 The firm shall satisfy the Board that the Chief Inspector and his accredited deputy are capable and responsible persons and shall supply written evidence of their qualifications and experience. The firm shall also satisfy the Board that the Chief Inspector and his accredited deputy are conversant with the Board's Requirements and Inspection Procedures so far as they affect the particular matters for which they are responsible. The Board shall be satisfied that the management of the organisation will be conducted with due regard to the character of airworthiness requirements.

3.1.3 The firm shall satisfy the Board that the number and qualifications of the inspection staff are adequate.

3.1.4 The firm shall satisfy the Board that the qualifications of specialists associated with the inspection staff, e.g. radiographers, are adequate.

3.2 Accommodation

3.2.1 The inspection staff shall be provided with adequate facilities and equipment to enable them to perform their duties effectively.

3.2.2 A quarantine store shall be provided for materials and parts until such times as they are proved to conform to specification and/or drawing.

NOTE : Recommendations on storage procedures are given in Civil Aircraft Inspection Procedures, Leaflet BL/1—6.

3.2.3 A bonded store shall be provided for materials and parts proved to conform to specification and/or drawing.

NOTE: Recommendations on storage procedures are given in Civil Aircraft Inspection Procedures, Leaflet BL/1—6.

3.3 Inspection Stamps. Stamps shall be of a type and design approved by the Board and shall be issued for individual inspectors.

NOTE : Recommendations on the type and design of inspection stamps are given in Civil Aircraft Inspection Procedures, Leaflet BL/2—1.

3.4 Records. Essential Records shall be kept of processes, final inspections, tests and techniques of examination relating to materials and parts, the failure of which might jeopardise the airworthiness of the aircraft or might cause the complete failure of ancillary equipment.

3.5 Approved Certificate. An approved certificate, the form of which shall be approved by the Board, shall be issued to the consignee in respect of the materials or parts detailed thereon. The certificate shall be in the following form :—

3.5.1 Manufacturing Firms. The wording of the certification shall be as follows :—

Certified that the whole of the materials and/or parts detailed hereon have been manufactured, tested and inspected and conform to the full requirements of the appropriate drawings and/or specifications relative thereto in accordance with the conditions of the Air Navigation Order and British Civil Airworthiness Requirements.

- 3.5.2 **Approved Stockists.** The wording of the certification shall be as follows :—
Certified that the whole of the materials and/or parts covered by this Certificate have been received under cover of the Approved Certificates or Release Notes quoted hereon, are in the same condition as when received and are re-issued under the conditions of the Air Navigation Order and British Civil Airworthiness Requirements.
- 3.5.3 The Approved Certificate shall be pre-numbered serially at the time of bulk printing.

4 REQUIREMENTS FOR THE MAINTENANCE OF APPROVAL

- 4.1 The inspection organisation shall be maintained at the standard originally approved. Material changes in the constitution of the inspection staff, including specialists associated with the inspection staff, e.g. radiographers, shall be notified to the Board in writing.
- 4.2 Inspection stamps shall not be transferred unless they have been quarantined for a minimum period of six months.
- 4.3 Essential inspection records shall be retained for a period of 5 years (unless earlier disposal is authorised by the Board) and shall not be destroyed without prior authorisation by the Board.
- 4.4 The Board shall at all reasonable times have access to the works for the purpose of satisfying itself that these Requirements are being complied with.
- 4.5 The Board may withdraw, suspend or modify the terms of approval if, in the opinion of the Board, the conditions on which approval is granted are not met. The terms of approval may also be changed as a result of changes in the firm's undertakings.

CHAPTER A7—6

CASTING CONSTRUCTORS

- 1 **GENERAL** A firm manufacturing castings for use in aircraft may be approved, subject to compliance with this chapter, to furnish reports to an Approved Design Organisation that the requirements of this chapter and the relevant requirements of Chapter D3—10 have been complied with.
- NOTES : (1) This chapter should be read in conjunction with Civil Aircraft Inspection Procedures Leaflets BL/4—4 and BL/4—5 dealing with the production and inspection of light alloy castings and steel castings respectively.
- (2) Reference to an aircraft shall be construed as including its components, engines, propellers, accessories, instruments, equipment and apparatus.
- 2 **APPLICATION** A.R.B. Form 455, copies of which may be obtained from the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2, shall be completed and returned to the Board.
- 3 **REQUIREMENTS FOR THE GRANT OF APPROVAL**
- 3.1 The inspection organisation of the firm shall have been approved in accordance with Chapter A7—5.

3.2 The organisation of the firm shall, in the opinion of the Board, be such as to ensure full and efficient co-ordination between its design office, inspection department, construction and experimental shops.

3.3 The firm's senior staff shall include specialists in foundry technique, having such qualifications and experience as will, in the opinion of the Board, enable them to conduct the work involved in establishing compliance with the requirements, as defined in paragraph 1.

4 CASTINGS CLASSIFIED AS CLASS 1 OR CLASS 2 PARTS The requirements of this paragraph 4 are applicable to castings classified as Class 1 or Class 2 parts.

4.1 The casting constructor shall be responsible for determining the technique necessary to produce sound castings in a manner which will ensure consistent reproduction of those qualities.

4.2 Aluminium Alloy and Magnesium Alloy Castings

4.2.1 Castings shall be inspected and tested in accordance with the procedures specified in the latest issue of British Standard L101 or in accordance with an equivalent procedure approved by the Board.

4.2.2 **Radiographic Examination.** Castings shall be examined visually for surface defects and then, as required by Chapter D3—10, shall be subjected to radiographic examination until the suitability of the foundry methods, patterns and alloy have been proved. When the suitability of the technique has been proved, the frequency of radiographic examination may then only be varied subject to agreement between the casting constructor and the aircraft constructor's Approved Inspection Organisation and in accordance with (a), (b) and (c) below :—

(a) **Class 1—Stressed Areas.** The number of radiographs taken of the stressed areas of each casting may be reduced provided that the Board is satisfied that the casting possesses an adequate reserve strength and the casting constructor and aircraft constructor's Approved Inspection Organisation are satisfied that the casting is such that visual inspection can be relied on to detect any flaw serious enough to produce appreciable risk of failure in service.

(b) **Class 1—Unstressed Areas.** The number of radiographs taken of the unstressed areas of each casting may be reduced.

(c) **Class 2.** The number of castings radiographed may be reduced.

NOTE : Guidance on the radiographic examination of castings is given in Civil Aircraft Inspection Procedures Leaflet BL/8—6.

4.2.3 **Change of Foundry Technique.** In the event of any change in technique which may affect the quality of the castings, the full examination technique of paragraph 4.2.2 shall be reverted to until the suitability of the new technique has been established.

4.2.4 **Break-up Examination.** A casting for which a radiographic examination is impracticable may be subjected instead to break-up examination prescribed in (a) to (e) below, provided that it has been designed by calculation to have an ultimate factor of not less than twice the ultimate factor for the stressing condition for the part concerned.

(a) The examination shall be carried out after the full heat treatment process by an Approved Inspection Organisation on a number of consecutively produced castings sufficient in number to establish the suitability of the casting technique.

- (b) For the purpose of break-up examination, the castings shall be broken by a steadily applied and controlled load in a press. All broken castings shall be retained for examination as may be required by the Board.
- (c) When the suitability of the casting technique has been established, the number of tests required on production castings may be reduced to not less than 5 per cent of the output.
- (d) Should unsatisfactory castings be produced during normal production under the provision of paragraph 4.2.4 (c) the technique shall be reviewed and the procedure of paragraph 4.2.4 (a) shall be reverted to until the suitability of the revised technique is established.
- (e) All relevant records concerning break-up examination shall be made available to the Board and shall be retained for a period of 5 years (unless earlier disposal is authorised by the Board) but in any case no records shall be destroyed without prior authorisation by the Board.

4.2.5 Crack Detection. Castings shall be subjected to a crack detection operation after the completion of any heat treatment necessary.

4.2.6 Pressure Testing. Pressure testing, when required, shall be in accordance with drawing requirements.

NOTES : (i) Recommendations on pressure testing are given in Civil Aircraft Inspection Procedures Leaflet BL/4—4.

(ii) Castings which fail a pressure test because of slight porosity may, in certain circumstances, be recovered by impregnation. Details of the circumstances in which this method may be used are given in Civil Aircraft Inspection Procedures Leaflet BL/6—21.

(iii) The recovery of defective castings by local fusion methods is also permitted in some instances. Details of repairs by these methods are given in Civil Aircraft Inspection Procedures Leaflet BL/4—4.

4.3 Steel Castings. Castings shall be inspected and tested in accordance with procedures agreed between the aircraft constructor and the casting constructor.

4.3.1 Radiographic Examination. Castings shall be examined visually for surface defects and then, as required by Chapter D3—10, shall be subjected to radiographic examination until the suitability of the foundry methods, patterns and alloy have been proved. When the suitability of the technique has been proved, the frequency of radiographic examination may then only be varied subject to agreement between the casting constructor and the aircraft constructor's Approved Inspection Organisation and in accordance with (a), (b) and (c) below :—

(a) **Class 1—Stressed Areas.** The number of radiographs taken of the stressed areas of each casting may be reduced provided that the Board is satisfied that the casting possesses an adequate reserve strength and the casting constructor and aircraft constructor's Approved Inspection Organisation are satisfied that the casting is such that visual inspection can be relied on to detect any flaw serious enough to produce appreciable risk of failure in service.

(b) **Class 1—Unstressed Areas.** The number of radiographs taken of the unstressed areas of each casting may be reduced.

(c) **Class 2.** The number of castings radiographed may be reduced.

NOTE : Guidance on the radiographic examination of castings is given in Civil Aircraft Inspection Procedures Leaflet BL/8—6.

4.3.2 Change of Foundry Technique. In the event of any change in technique which may affect the quality of the castings, the full examination technique of paragraph 4.3.1 shall be reverted to, until the suitability of the new technique has been established.

4.3.3 Break-up Examination. A casting for which a radiographic examination is impracticable may be subjected instead to break-up examination as prescribed in (a) to (d) below, provided that it has been designed by calculation to have an ultimate factor of not less than 1.5 the ultimate factor for the stressing condition for the part concerned.

- (a) The examination shall be carried out by an Approved Inspection Organisation on a number of consecutively produced castings sufficient in number to establish the suitability of the casting technique.
- (b) Wherever possible the break-up test shall be made by steadily applied and controlled loading in a suitable press. Alternatively one of the following methods may be substituted :—

- (i) Breaking up under a tup or hammer.

- (ii) Cutting up in a manner agreed by the aircraft constructor and the casting constructor.

When the castings are fractured the material shall be in the hardened, but not tempered, condition.

- (c) When the suitability of the casting technique has been established, the number of tests required on production castings may be reduced to not less than 5 per cent of the output.
- (d) Should unsatisfactory castings be produced during normal production under the provision of paragraph 4.3.3 (c), the technique shall be reviewed and the procedure of paragraph 4.3.3 (a) shall be reverted to until the suitability of the revised technique is established.

4.3.4 Flaw Detection. Where required, castings should be subjected to an electro-magnetic flaw detection test, but where this method is not suitable (e.g. for heat-resisting steel castings) an alternative method agreed by the aircraft constructor and casting constructor shall be employed.

NOTE : Guidance on electro-magnetic flaw detection is given in Civil Aircraft Inspection Procedures Leaflet BL/8—5.

5 REQUIREMENTS FOR THE MAINTENANCE OF APPROVAL

- 5.1 The organisation of the firm shall be maintained at a standard at least as high as that originally approved by the Board. Material changes in the constitution of the firm's senior staff, as given in A.R.B. Form 455, shall be notified to the Board in writing.
- 5.2 Records shall be kept of all treatments and tests to which castings have been subjected.
- 5.3 At all reasonable times, the Board's authorised representatives shall have access to all drawings, test reports and records, and shall also have the right to witness all tests in any way associated with establishing compliance with the Requirements.
- 5.4 The Board may withdraw, suspend or modify the terms of approval if, in the opinion of the Board, the conditions on which approval is granted are not met. The terms of approval may also be changed as a result of changes in the firm's undertakings.

CHAPTER A7—7

WELDERS

- I **APPLICABILITY** The procedure prescribed in this chapter is applicable to persons welding parts which are essential to the airworthiness of any aircraft affected by the Requirements, where the welding process is such that the making of a sound joint depends

largely on the competency of the operator (as in the oxy-acetylene and arc welding processes) and to the methods of checking the setting and continued accuracy of automatic welding machines (as in the resistance welding process).

2 GRANT OF APPROVAL

2.1 Each welder shall be approved by the Board. The grant of such approval may be obtained in the following manner :—

2.1.1 If the welder is employed by a firm which has an Inspection Organisation approved by the Board, the Chief Inspector shall make arrangements for the welder to prepare a set of test specimens (see paragraph 3). The Chief Inspector shall arrange to submit the test specimens to an approved test laboratory for examination, together with full particulars of the welder concerned, material used, and identification marks on the test specimens. When the test specimens have been examined (see paragraph 4) the Chief Inspector shall arrange to forward the examination reports, together with full particulars to the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2.

2.1.2 If the welder is employed by a firm which is engaged in aircraft overhaul or repair work, and which has no Inspection Organisation approved by the Board, A.R.B. Form 408, copies of which may be obtained from the Board, shall be completed. The applicant shall return this form to the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2, or to the local Area Office of the Board. The Board's Surveyor will then arrange to supervise the preparation of test specimens which should be forwarded by the firm to an approved test laboratory for examination. The cost of the examination at the approved test laboratory will be chargeable to the applicant.

2.2 The grant of approval will be notified in a certificate of approval sent by the Board to the welder. Approval may be granted in any of the following groups :—

Group 1—Aluminium Alloys.

Group 2—Magnesium Alloys.

Group 3—Carbon Steels.

Group 4—Corrosion and Heat-Resisting Steels.

Group 5—Nickel Alloys.

Group 6—Copper Base Alloys.

Group 7—Titanium Alloys.

3 PREPARATION OF TEST SPECIMENS

3.1 The standard test pieces illustrated in Figures 1, 2 and 3 of paragraph 3.4 for oxy-acetylene welding, or the standard test pieces illustrated in Figures 1, 2 and 4 for arc welding, or, for either process, such special test pieces as may be decided by the Board, shall be made by the welder using processes and materials appropriate to the approval sought. Test specimens cut from the welded test pieces, shall be prepared under the supervision of an Inspection Organisation approved by the Board or under the supervision of a Board's Surveyor.

3.2 If approval is sought only for the welding of sheet, the preparation of the test specimens illustrated in Figure 1 will normally be sufficient to determine competency.

NOTE : The approval granted to the welder will be limited accordingly.

3.3 Filler rods of the same composition as the parent metal or filler rods manufactured to approved specifications shall, as appropriate, be used in the welding process.

3.4 The standard test pieces and test specimens are illustrated in Figures 1, 2, 3 and 4.

NOTE : The dimensions given may be regarded as approximate.

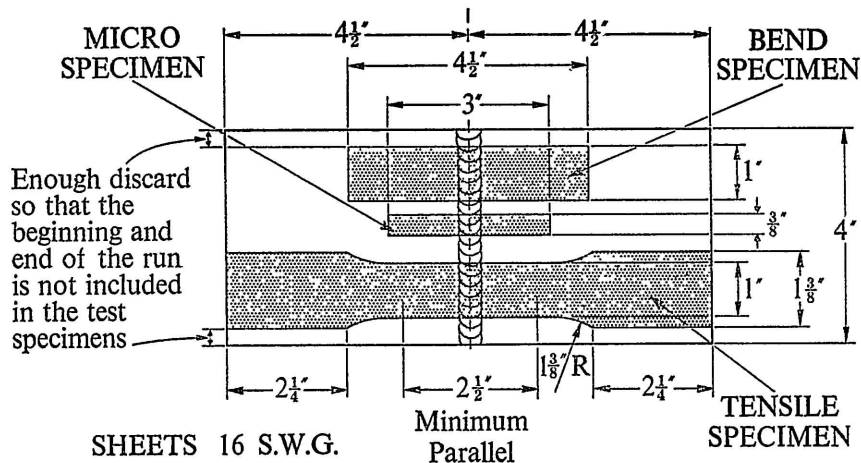


FIGURE 1.

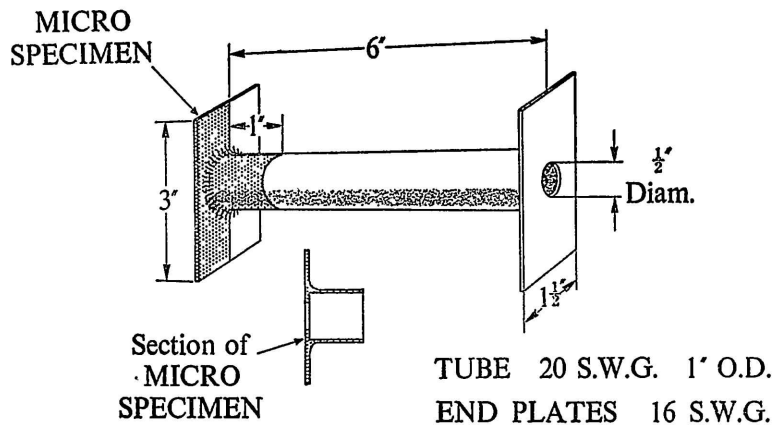


FIGURE 2.

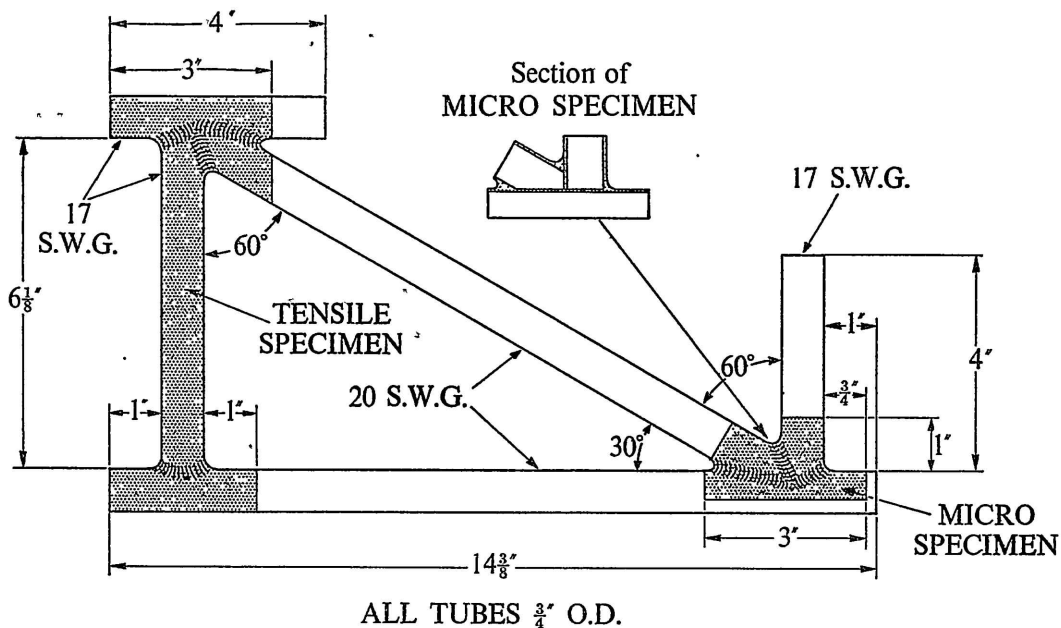
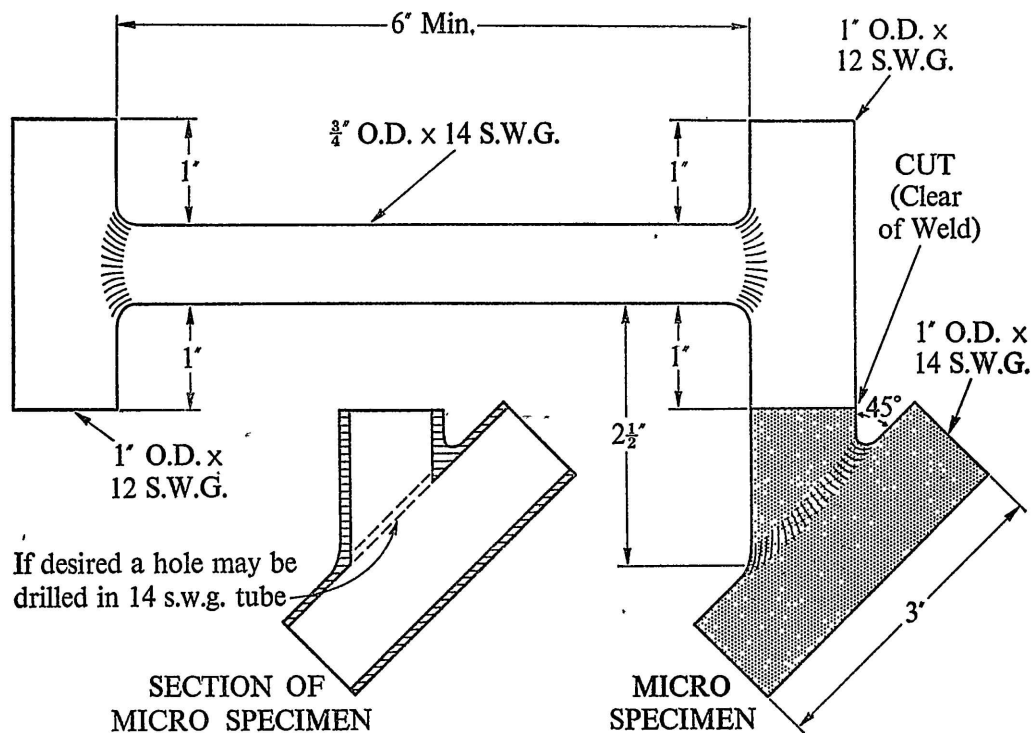


FIGURE 3.



DIMENSIONS TO BE REGARDED AS APPROXIMATE

FIGURE 4.

4 EXAMINATION OF TEST SPECIMENS

4.1 Test specimens made in accordance with paragraphs 3.1 to 3.4 shall be examined at an approved test laboratory as follows :—

4.1.1 Tensile specimens shall be tested in direct tension to destruction. The ultimate stress (calculated on minimum area of cross-section of the specimen) and the position of the break shall be recorded in each case.

4.1.2 Bend specimens shall be tested in bending so that the weld lies along the axis of the bend and the base of the weld "V" is on the inner side of the specimen after bending. The specimen shall bend through the angle, and over the radius of the bend, appropriate for the test.

NOTE : Recommendations on the appropriate radii and angles of bend for materials of the various groups listed in paragraph 2.2 are given in Civil Aircraft Inspection Procedures, Leaflet BL/6—4.

4.1.3 Micro specimens shall be examined microscopically and the results of the examination shall be recorded.

NOTE : Recommendations on the results expected from test specimens are given in Civil Aircraft Inspection Procedures, Leaflet BL/6—4.

4.2 The approved laboratory undertaking the examination of test specimens shall provide a report giving full details of the examination of each set of test specimens submitted.

5 MAINTENANCE OF APPROVAL

5.1 The approval granted by the Board to a welder may be maintained in the following manner :—

5.1.1 If the welder is employed by a firm which has an Inspection Organisation approved by the Board, the Chief Inspector shall arrange for periodical check examinations of the welder's competency. At each periodical check examination the standard test piece illustrated in Figure 1 of paragraph 3.4, or such special test pieces as may be decided by the Board, shall be made by the welder using processes and materials appropriate to the maintenance of approval. Test specimens, cut from the welded test pieces, shall be prepared under the supervision of the Approved Inspection Organisation and the Chief Inspector shall arrange to submit the test specimens to an approved test laboratory for examination ; if the results of this examination are satisfactory the welder's certificate of approval shall be completed by the Chief Inspector. Complete records of the periodical check examinations shall be kept at the firm and all such records shall be held available to the Board.

NOTE : (1) Where, for example, the welder is concerned mainly with the welding of tubular sections, the Board may require that a representative test piece be submitted for examination in lieu of the standard test piece illustrated in Figure 1.

(2) The maximum period normally allowed between check examinations is six months, but more frequent examination may be necessary in respect of corrosion-resisting steels and other special alloys. Examination at intervals not exceeding three months is usual for welding by an arc welding process. Check test samples may, where practicable, be prepared from selected samples of production work in lieu of standard test pieces.

5.1.2 If the welder is employed by a firm which is engaged in aircraft overhaul or repair work, and which has no Inspection Organisation approved by the Board, A.R.B. Form 408, copies of which may be obtained from the Board, shall be completed. The applicant shall, when each check examination falls due, return this form

to the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2, or to the local Area Office of the Board. A Board's Surveyor will then arrange to supervise the preparation of test specimens which should be forwarded by the firm to an approved test laboratory for examination. The cost of the examination at an approved test laboratory will be chargeable to the applicant.

- 5.2 The Board reserves the right to select samples of approved welders' work at any time for additional check examination purposes.

6 RESISTANCE WELDING

- 6.1 Test samples as illustrated in Figures 5 and 6 shall be prepared as necessary to check the satisfactory setting of the welding machine on which the work is being done. Where the form and/or dimensions of the actual production parts would not be properly represented by the test samples illustrated in Figures 5 and 6, non-standard samples may be employed.

NOTE : Recommendations on the methods of conducting the tests and on the results expected for spot welding are given in Civil Aircraft Inspection Procedures Leaflet BL/6—12. Similar recommendations for seam welding are given in Civil Aircraft Inspection Procedures Leaflet BL/6—16.

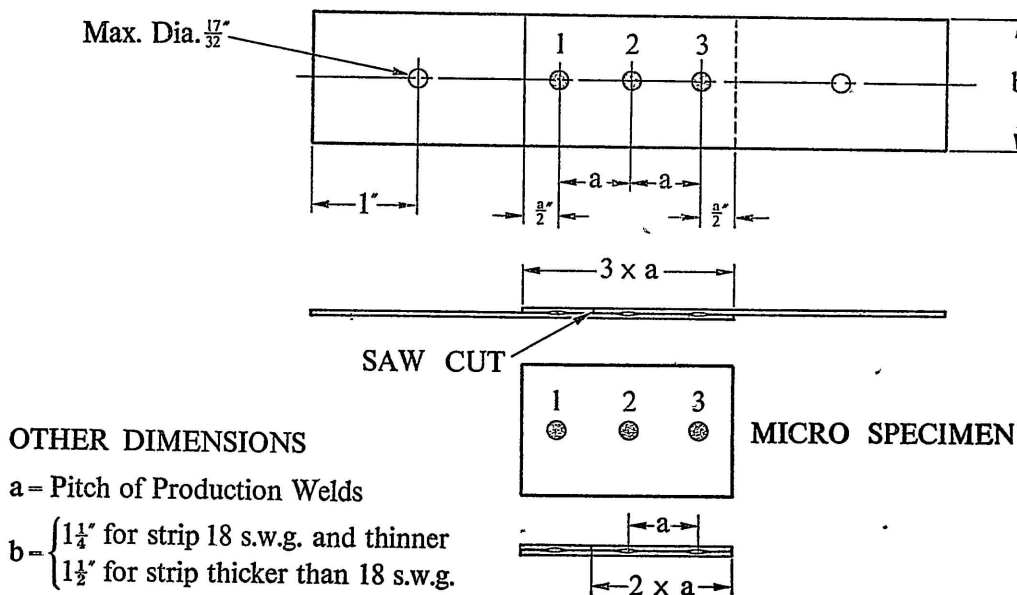


FIGURE 5.

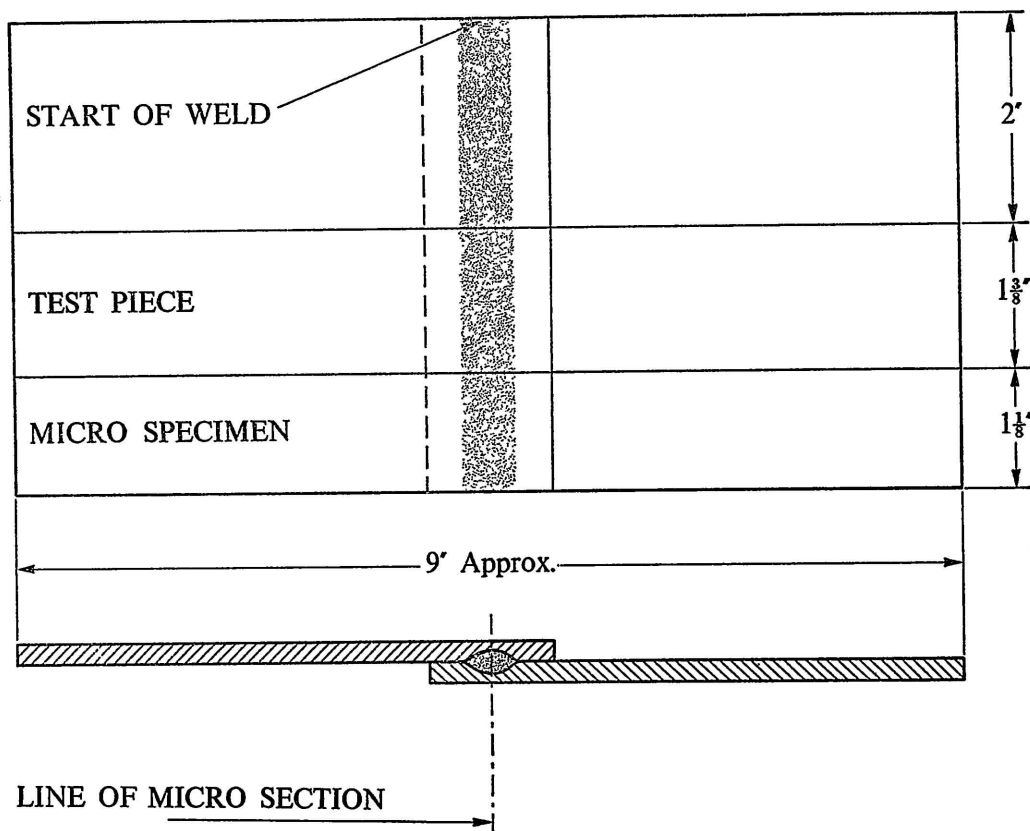


FIGURE 6.

CHAPTER A7—8

DESIGN ORGANISATIONS (EXPERIMENTAL OR TEST FLIGHTS)

- 1 GENERAL The organisation of a firm may be approved to certify the flight of an aircraft in accordance with the "B" Conditions of the Air Navigation Order.

1.1 The aircraft may fly only for the following purposes :—

- 1.1.1 Experimenting with or testing the aircraft and its equipment.
- 1.1.2 Enabling the aircraft to qualify for the issue or validation of a certificate of airworthiness.
- 1.1.3 The approval of a modification of the aircraft.
- 1.1.4 Proceeding to or from a place at which any experiment, test, inspection or weighing of the aircraft is to take place for the purpose referred to in paragraphs 1.1.1, 1.1.2 or 1.1.3.

1.2 A firm may be approved for these purposes subject to compliance with the conditions set out in the following paragraphs.

- 2 APPLICATION Application for approval should be made to the Secretary, Ministry of Aviation, Shell Mex House, London, W.C.2.

3 REQUIREMENTS FOR THE GRANT OF APPROVAL

- 3.1 The qualifications and experience of the design office staff and the inspection staff shall be in accordance with the requirements of Chapter A7—1 and Chapter A7—5 respectively.
- 3.2 The qualifications and experience of the flight test personnel shall be to the satisfaction of the Board.
- 3.3 The flight test personnel shall be provided with adequate facilities and equipment to enable them to perform their duties effectively.
- 3.4 The distinguishing identification mark allocated to the approved organisation shall be applied to the aircraft before flight, unless the aircraft has already been registered under Articles 1 and 2 of the Air Navigation Order, 1960, in which case the nationality and registration marks must be applied.

4 FLIGHT CREW The number and qualifications (including licences where applicable) of the minimum flight crew shall be subject to prior agreement between the firm and the Board for each type of aircraft concerned.

NOTE : This arrangement will not prejudice the minimum flight crew finally specified in the Flight Manual.

5 CERTIFICATE OF CLEARANCE Prior to the first flight of the aircraft a Certificate of Clearance shall be signed by the Chief Designer and the Chief Inspector, or their named deputies.

- 5.1 The Certificate of Clearance, the format of which shall be agreed with the Board, shall contain the following information.
- (i) The type and serial number of the aircraft.
 - (ii) The maximum clearance weight.
 - (iii) The centre-of-gravity range.
 - (iv) Essential speed limitations.
 - (v) Minimum crew.
 - (vi) Any restrictions deemed necessary by the design organisation.
- 5.2 The period of validity of the Certificate of Clearance shall depend upon changes embodied in the aircraft, but a major modification will normally require an endorsement of the original certificate or the issue of a replacement certificate.
- 5.3 It shall be the responsibility of the Chief Inspector to ensure that the pilot is satisfied with the information provided for any particular flight.

6 REQUIREMENTS FOR THE MAINTENANCE OF APPROVAL The organisation shall be maintained at the standard originally approved and the Board's representative shall, at all reasonable times, be given the access necessary to establish this. In any case material changes in the constitution of the organisation shall be notified to the Board in writing. The Board may recommend withdrawal, suspension or modification of the terms of approval if, in the opinion of the Board, the conditions on which approval is granted are not met. The terms of approval may also be changed as a result of changes in the firm's undertakings.

CHAPTER A7—9

FORGING MANUFACTURERS

- 1 GENERAL** A firm manufacturing forgings for use in aircraft may be approved, subject to compliance with this chapter, to furnish reports to an Approved Design Organisation that the requirements of this chapter and the relevant requirements of Chapter D3—12 have been complied with.

NOTE : Reference to an aircraft shall be construed as including its components, engines, propellers, accessories, instruments, equipment and apparatus.

- 2 APPLICATION** A.R.B. Form 456, copies of which may be obtained from the Secretary, Air Registration Board, Chancery House, Chancery Lane, London, W.C.2, shall be completed and returned to the Board.

3 REQUIREMENTS FOR THE GRANT OF APPROVAL

- 3.1** The inspection organisation of the firm shall have been approved in accordance with Chapter A7—5.

- 3.2** The organisation of the firm shall, in the opinion of the Board, be such as to ensure full and efficient co-ordination between its design office, inspection department, manufacturing and experimental shops.

- 3.3** The firm's senior staff shall include specialists in forging techniques, having such qualifications and experience as will, in the opinion of the Board, enable them to conduct the work involved in establishing compliance with the Requirements, as defined in paragraph 1.

4 TESTS FOR FORGINGS CLASSIFIED AS CLASS 1 AND CLASS 2 PARTS The requirements of this paragraph 4 are applicable to forgings classified as Class 1 or Class 2 parts.

- 4.1 General.** All forgings shall be subjected to the tests specified in the latest issues of British Standards L100 or S100, as appropriate, or in accordance with an equivalent procedure approved by the Board.

- 4.2 Prototype Forgings.** The requirements of paragraphs 4.2.3 and 4.2.4 are applicable only to highly stressed or complex forgings.

- 4.2.1** A forging of each new pattern shall be selected at random for sectioning and etching and shall be shown to possess a satisfactory macro-structure.

- 4.2.2** The aircraft constructor and the forging manufacturer shall agree on control procedures applicable to each design of forging.

NOTE : Where practicable, test pieces to check that a forging has not been overheated during manufacture should be provided.

- 4.2.3** The aircraft constructor and forging manufacturer shall agree a drawing which shows the locations of test pieces to be extracted from a fully heat-treated prototype of each highly stressed or complex forging. The agreed properties to be obtained from these test pieces shall be indicated on the drawing and the forging manufacturer shall certify that the test pieces achieve these properties.

4.2.4 The number of test pieces required shall be sufficient to enable a comprehensive assessment to be made of the proof and ultimate strength and of the elongation values in the most critical regions. Whilst the actual total of test pieces to be extracted can only be determined according to the size and nature of the forging, both longitudinal and transverse specimens shall be included and, as far as possible, transverse specimens at a suitable range of positions across the flash line.

4.3 **Series Forgings.** The aircraft constructor and the forging manufacturer shall agree upon the tests for series forgings, i.e. those forgings produced after the production technique has been established. Any reduction in the frequency of cut-up tests should take into consideration the degree of examination of macro-structure (see paragraph 4.2.1) to which the forgings are subjected.

5 **GENERAL INSPECTION** All forgings classified as Class 1 and Class 2 parts shall be examined for cracks, and other defects, particularly at the flash line, by a method to be agreed between the aircraft constructor and the Approved Inspection Organisation responsible for conducting the examination. Wherever possible, large highly stressed forgings shall be ultrasonically tested in the "as forged and rough machined" condition, in which case the particular technique to be used and the standard of acceptance shall be agreed between the aircraft constructor and the forging manufacturer.

6 REQUIREMENTS FOR THE MAINTENANCE OF APPROVAL

6.1 The organisation of the firm shall be maintained at a standard at least as high as that originally approved by the Board. Material changes in the constitution of the firm's senior staff, as given in A.R.B. Form 456, shall be notified to the Board in writing.

6.2 Records shall be kept of all treatments and tests to which forgings have been subjected.

6.3 At all reasonable times the Board's authorised representatives shall have access to all drawings, test reports and records, and shall also have the right to witness all tests in any way associated with establishing compliance with the Requirements.

6.4 The Board may withdraw, suspend or modify the terms of approval if, in the opinion of the Board, the conditions on which approval is granted are not met. The terms of approval may also be changed as a result of changes in the firm's undertakings.